Increasing the Ambition of EU Emissions Trading

An Assessment of the Draft Second Allocation Plans and Verified Emission Reports of Germany, the United Kingdom and the Netherlands

A report to Greenpeace International

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Contents

List of Figures

List of Tables

0 Executive Summary

The draft Second National Allocation Plans (NAPs) of Germany, the United Kingdom, and the Netherlands have been assessed based on the questions of whether these NAPs ensure meeting the respective national commitments under the Kyoto Protocol in the short term and whether they stimulate the development and the diffusion of low carbon intensive technologies to meet larger emission cuts in the longer term.

In short, these draft NAPs place a disproportionate burden for emissions reductions on the non-ETS sectors in terms of meeting the countries respective commitments under EU Burden Sharing agreement to meet the targets in the Kyoto Protocol. This effectively lets the industries covered 'off the hook', and places an extra burden on the transport, commercial, household, and other sectors not covered by the ETS. While each of the countries in question is likely to meet its Kyoto targets, they are not effectively using the system to drive emissions reductions in the sectors covered by the ETS in the short term. Likewise, the three MS are not using the system effectively to guide long-term investments in clean technologies required to meet the rigorous climate targets in the medium term (2020) or longer term (2050). For the EU long-term emission reductions of 80 % are considered necessary to keep global mean temperature rise below 2° C above pre-industrial levels.

The main results of this report may briefly be summarized as follows:

Short term

With respect to the short-term emission targets for 2008-2012, data from the latest National Inventory Reports for 2006 considered alongside the Draft NAPs suggest that:

- In Germany greenhouse gas emissions were reduced significantly between 1990 and 1998 – partly due to the so called 'wall-fall' profits, i.e. the reconstruction and modernization of the energy and industrial systems of the former East Germany. Since then, however, emissions have been increasing in the power sector, and stagnating overall. Germany appears to be on a path to meet its Burden-Sharing target through domestic measures, but additional efforts are now required to close the remaining gap of 3.5 %.
- In the UK, also due to special circumstances in the early 1990s, significant reductions in greenhouse gas emissions have been achieved. The liberalization of the energy markets has led to a "dash for gas" in the power sector. Since then, total emissions in UK have been relatively stable and the UK is clearly on track to meet its Burden-Sharing target on its own.
- For the Netherlands, current CO_2 emission levels higher than in 1990, and the Burden Sharing Target can only be met by significant reductions of non CO_2 emissions and by relying heavily on the use of the Flexible Mechanisms of the Kyoto Protocol: 50 % of the reductions needed to achieve the Burden Sharing Target will need to be paid for by the Dutch state, purchasing credits from JI and CDM-projects. If

prices for ERUs and CERs continue to increase, this budget will have to be adjusted upwards.

Longer term

With respect to the mid-term and long-term emission reduction target of 30% and 80%, our extrapolation analyses imply:

- For emission reductions of -30% by 2020 and -80% by 2050, Germany's hypothetical ETS emissions target would be approx. 400 Mt CO_2e/a by 2020 (or 345 Mt CO_2e/a to meet the national -40 % target) and around 115 Mt CO_2e/a by 2050; the ETS-emission target of the UK would be around 200 Mt CO_2e/a in 2020 and roughly 55 Mt CO_2e/a in 2050, and the Netherlands's hypothetical ETS emissions target for 2020 would be about 55 Mt CO_2e/a by 2020 and some 15 Mt CO_2e/a by 2050. The hypothetical ETS target assumes equi-proportional emission reductions in all sectors.[1]
- If emissions continue to develop as in the recent past, Germany, the UK and the Netherlands will be far from achieving their mid-term or even long-term indicative reduction targets.
- The emission targets implied at the macro level of the NAPs suggest that Germany, the UK and the Netherlands did not use the NAPs to lead their economies on a reduction path towards these mid-term or long-term targets. To get there, they would have to be significantly more ambitious.
- The analyses on the ambition levels of the ET-budget for the Draft NAPs for 2008-2012 show that Germany and The Netherlands decrease the ET-budget for the second phase compared to the first phase, but the implied reduction for Germany is rather small. The UK and The Netherlands decrease the ET-budget compared to projected emissions of the ET-installations; if the projected growth rates turn out to be correct, the implied reduction is about 10 % for the UK and about 16% for The Netherlands. The experience in the case of Germany, which did not provide projections for emissions and ended with a rather large surplus allocation in 2005, highlights the importance of also using emission projections to determine the size of the ET-budget. Thus, Germany should also provide emission projections for NAP 2.

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1 The hypothetical emission targets are based on verified emission data for 2005 for installations included in the first phase of the EU ETS. Since this data does not include emissions from opt-out installations in the first phase and additional installations joining the EU ETS in the second phase, these targets tend to (slightly) underestimate the hypothetical burden sharing target of the ETS sector in 2008-12.

Improving the NAPs

- Regarding ETS-Non ETS split: in all three MS the budgets for the ET-sectors are too high, particularly in Germany. Thus, compared to the optimal split, the current budgets benefit companies with ET-installations at the expense of the other sectors (private households, transport), and overall reduction costs for society are too high. From an economic perspective, the size of the budgets for the ET-sector and the non-ET-sector should be determined such that (before international trading starts) the total abatement costs are minimized, i.e. that the marginal costs of the abatement measures which are realized in the trading sectors and the non-trading sectors are equal. Thus, sectors with cheaper reduction measures should contribute more reductions (relatively) to achieving the emission target. Of the three countries analyzed, the UK appears to be closest to an optimal split, but a final judgement is difficult without verified emissions data for all installations included in the second phase.
- The analyses and arguments developed in this report suggest that – although some "improvement" in the NAPs is noticeable – there are still many allocation rules in the Draft NAPs for Germany, the Netherlands and the UK which reflect attempts made to use the EU ETS for distributional effects and to preserve existing energy structures. These rules often result in negative effects such as increased costs of climate protection, shifting the burden of emissions' reduction to operators of installations not benefiting from special provisions, or to a transfer of wealth and windfall profits.
- With respect to the aims of this project, the analyses carried out and the arguments presented show that there is still ample room to increase the ambition level of the Draft NAPs of Germany, the Netherlands, and to a lesser extent, the UK. This holds true for both the macro level, i.e., the overall budget, as well as for the micro level, that is, the design of the rules governing the allocation of allowances.

General Recommendations

Based on the arguments derived from economic theory and from empirical evidence, the following is being recommended for the future design of NAPs under the EU ETS:

- In the long run all allowances should be auctioned off.
- For the trading period of 2008-2012 Member States should set the share of allowances to be auctioned off at the maximum level allowed by the Emissions Trading Directive, i.e., at 10% of the total budget.
- Auctioning allowances would reduce windfall profits and would be expected to .have the same effects on output prices as free allocation.

- To address early action and provide incentives for replacement of inefficient technologies gratis allocation for existing installations should be based on product-specific benchmarks for sufficiently homogenous product groups.
- Undifferentiated benchmarks for existing installations would provide the highest incentives for the replacement of inefficient technologies.
- Allocating allowances for free to new projects amounts to subsidizing output and increases overall costs to achieve emission reduction targets for society.
- New projects should acquire the necessary allowances at market prices.
- If new projects receive allowances for free, allocation should be based on BAT-benchmarks and standardized load factors.
- Differentiating benchmarks or load factors (e.g. by technologies or fuels) results in distorted incentives for innovation, subsidies for particular technologies or fuels and eventually higher overall reduction costs for society.
- Rather than providing planning security for investments via long-term gratis allocation rules for new projects, governments should signal future scarcity of emission allowances by setting credible long-term emission targets.

1 Introduction and overview

On 1 January 2005, the European Union launched an EU-wide trading system (EU ETS) for CO_2 –emissions, covering approximately 11,000 installations from the energy industry and other carbon-intensive industry sectors. These installations account for nearly 45% of total CO_2 emissions, and about 30% of all greenhouse gases in the EU (CEC 2005a). As its key climate policy instrument, the EU expects the EU ETS to help its Member States (MS) cost-efficiently fulfil their obligations under the United Nations Framework Convention on Climate Change, the Kyoto Protocol and the Burden-Sharing Agreement (CEC 2001). In the Kyoto Protocol, the EU has committed to reducing emissions of the greenhouse gases CO_2, CH_4, N_2O, SF_6, PFCs and HFCs by 8%, compared to base year levels, by 2008-2012.[2] In the subsequent Burden-Sharing Agreement, the EU 15-member target was broken down into targets for individual Member States. The average reduction target for the new Member States is slightly below 8%. The first trading period of the EU ETS, considered a learning phase, lasts from 2005 to 2007. The second trading period runs for five years — as do all subsequent periods — and thus coincides with the 2008-2012 Kyoto commitment period.

Rationale for using emissions trading to address climate change

The primary purpose of using an emissions trading system to address climate changes is cost-efficiency — achieving a given emission target at minimum cost. The cost of reducing emissions will eventually be reflected in the market price of EU emission allowances (EUAs), inducing demand for innovative, energy/carbon saving processes, products and services. This increased demand will in turn lead to more research and development (R&D), and the invention, adoption and market diffusion of such innovations (dynamic efficiency).[3] In contrast to other environmental instruments, emissions trading systems also assure that a particular environmental target is met. Since the quantity of allowances allocated (emissions cap) corresponds to the emission target for a particular period, the amount of greenhouse gases emitted may not be higher than the number of allowances allocated (apart from sanctions). For these reasons, emissions trading is often considered superior to other regulations.[4] The rate and direction of the technological change generated by the EU ETS depends on the design of the scheme. The design of the EU ETS is governed by the EU Emissions Trading Directive 2003/87/EC (CEC 2003b), as well as by the National Allocation Plans (NAPs) of individual Member States.

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2 The base year for CO_2, CH_4 and N_2O is 1990; for SF_6, HFCs and PFCs it is 1995.

3 In this sense, emissions trading is also said to represent a demand-oriented regulation — in contrast to supply-oriented regulation, like subsidies for R&D.

4 See, for example, a recent literature survey by ZEW (Oberndorfer et al. 2006).

The role of National Allocation Plans in the EU Emissions Trading System

National allocation plans (NAPs) are the centrepiece of the EU ETS: at the macro level, NAPs state the total quantity of allowances available in each period (ETS budget); at the micro level, they determine how these allowances will be allocated to individual installations. Because the MS differ considerably in terms of their Kyoto/burden-sharing emission targets, reduction potentials and progress made so far, the Directive leaves it up to the individual MS to decide how to meet their emission targets. At the macro level, the NAPs determine to what extent the individual MS may rely on the EU ETS to achieve their emission targets. That is, NAPs establish how to "split the pie": How many allowances should be allocated to the installations covered by the EU ETS (trading sectors), and what are the expected emissions from installations not covered by the EU ETS (non-trading sectors)? NAPs need to be approved by the European Commission, and the deadline for submission is 30 June 2006 for the second trading period (2008-2012). According to the Directive, national governments must give the general public an opportunity to express their views and comment on draft versions of the NAPs prior to submission (CEC 2006a). Once submitted, the European Commission has three months for the approval process, providing MS three months at the end of 2006 to draft their final NAPs.

Criteria from the Directive to assess NAPs

The Commission will assess NAPs based partially on the following criteria:[5]

- Consistency with the MS' EU Burden-Sharing Agreement and national climate change programmes (Criterion 1);
- Consistency with assessments of historical and projected emission trends towards achieving the required emission targets (Criterion 2);
- Consistency with potential to reduce emissions (Criterion 3);
- Not discriminating against nor favouring certain companies or sectors (Criterion 5);
- Information on treatment of new entrants (Criterion 6);
- Information on how clean technologies are taken into account (Criterion 8);
- Due account to comments made by the public (Criterion 9);

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5 Criteria (1) to (6) are given in Annex III of the Emissions Trading Directive (CEC 2003b), together with other criteria not mentioned here to save space. The last criterion results from Article 30 of the Directive 2003/87/EC (CEC 2003b) in combination with the "Linking Directive" 2004/101/EC (CEC 2004b).

- Consistency with MS' supplementarity obligations under the Kyoto Protocol for the maximum number of CERs and ERUs which may be used by operators to cover CO_2 emissions in the EU ETS.[6] The use of the EU ETS is in itself regarded as a domestic (intra-EU) measure.

The Commission subsequently published non-binding guidelines on how it will interpret these criteria when assessing NAPs (CEC 2004a p.5, CEC 2005b). In particular, for the first period (2005–2007), when no international targets exist, the ETS budget is required to correspond to a reduction path which "is intended to be a trend line, not necessarily a straight one, but one that is leading towards or goes beyond" achieving the burden-sharing target.[7]

Cost efficient size of budget for ET-sector

From an economic perspective, the size of the budgets for the ET-sector and the non-ET-sector should be determined such that (before international trading starts) the total abatement costs are minimized, i.e., the marginal costs of the abatement measures which are realized in the trading sectors and the non-trading sectors are equal. Thus, sectors with cheaper reduction measures should contribute more reductions (relatively) to achieving the emission target. At least to some extent, criterion 3 — potential to reduce emissions — addresses this issue. According to the NAP Guidance (2004), this "criterion will be deemed as fulfilled if the allocation reflects the relative differences in the potential between the total covered and total non-covered activities," where "potential" also means economic, and not only technical, potential.

Medium- and long-term targets for climate policy

Since climate change is a long-term policy challenge, the NAPs should also be consistent with the long-term international and national emission reduction targets. The EU Council considers greenhouse gas emission reductions of 15-30% (compared to 1990 levels) by 2020 a necessary mid-term target for industrialized countries in order to limit the mean global temperature increase by the end of the century to 2° Celsius compared to pre-industrialized levels (European Council 2005). Taking into account projected emission growth in developing countries, a recent report by the German Federal Environmental Agency, among others, requires even more stringent long-term targets: 80% reductions by 2050 for the group of developed countries (Federal Environmental

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6 All Kyoto ratifying countries have committed themselves to fulfil part of the Kyoto target domestically. However, the definition of this so-called supplementarity is more qualitative than quantitative. In the Marrakesh Accords, the following wording is used: "…the use of the mechanisms shall be supplemental to domestic action and that domestic action shall thus constitute a significant element of the effort made by each Party included in Annex I…" (UNFCCC 2001).

7 Subsequently, the EC approval process for the first round has led to substantial cuts in the ETS budgets for several MS, including a 3% cut (from 99.3 to 95.3 Mt) for the Netherlands.

Agency Germany 2006). This coincides with the upper range of the long-term recommendations of the March 2005 Environment Council (European Council 2005), which considers reductions by developed countries of 60-80% to be consistent with the EU 2-degree target.

Box: EU Emissions trading and incentives for innovation

Under the EU emissions trading plan, national governments allocate a certain absolute number of CO_2-emission allowances (EUAs) to installations operators per year.[8] The allocation decision is made for the entire trading period; allowances are issued each year. Operators have to surrender the number of allowances equivalent to the amount of CO_2-emissions caused by their installations during the previous year. Otherwise, sanctions have to be paid and missing allowances surrendered in the following year.[9] This is crucial for the integrity and functioning of the scheme. Operators of installations whose emissions are lower than their allocated allowances — because, for example, they invested in energy-efficient equipment — may sell their surplus allowances to those operators who have only high-cost abatement measures available, and therefore require additional allowances to cover surplus emissions. Ideally, a "cap and trade" approach ensures that emissions are reduced where it is cheapest to do so, and that the market price for EUAs reflects the scarcity of allowances in the system. Eventually, the market mechanism ensures that all participants face the same marginal abatement costs so that overall reduction costs are minimized (*static efficiency*). According to standard economic theory, under ideal conditions (absence of market power, perfect information), the price of EUAs will be independent of the initial distribution of allowances among participants. Similarly, the price of EUAs is independent of whether allowances are allocated for free or auctioned off.[10]

The market price should not only reflect the marginal abatement costs, but also set monetary incentives to adopt new, more energy-efficient technologies with lower emissions (*dynamic efficiency*). These investments either free up emission allowances which may be sold at the market price, or they allow installations operators to avoid having to purchase allowances at that price. Because of these additional revenues/cost savings, emissions trading should lead to *direct innovation effects* in the form of the accelerated diffusion of new energy-efficient technologies (Tietenberg 1985, p. 33). At the same time, there are additional incentives for R&D in such technologies.[11] Clearly, the relevance of emissions trading for innovation crucially hinges on the market price

8 One allowance (EUA) gives the right to emit one tonne of CO_2.

9 For the first trading period (2005-2007), these sanctions are 40 € per missing EUA; in the second trading period (2008-2012), they are 100 €.

10 In an auction, the bids of the participants lead to the outcome that marginal abatement costs are equal across all participants.

11 Of course, the costs for emissions are only one of many determinants of innovation.

for allowances. The higher the price for allowances, the higher are the incentives for R&D, invention, adoption and diffusion in energy-efficient technologies.

If the additional costs of covering CO_2 emissions are passed on and included in the product (e.g. electricity) prices, emissions trading may also induce *indirect innovation effects* on the demand side where these products are used as inputs (e.g. energy-intensive industries like the aluminium industry, but also private households). The relevance of these indirect effects depends on the extent to which the additional costs for CO_2-emissions can be passed on, as well as on the cost-share of those inputs. Thus, the innovation effects of emissions trading are not limited to the companies directly covered by the scheme.[12]

Purpose of this report

As part of their campaign to strengthen the ambition level of EU emissions trading, Greenpeace International asked Fraunhofer Institute Systems and Innovation Research (Fraunhofer ISI), Karlsruhe, Germany, in cooperation with the Centre for Energy and Environmental Markets (CEEM) at the University of New South Wales, Sydney, Australia and Jos Cozijnsen, consulting attorney on emissions trading, Utrecht, the Netherlands, to assess the early draft Second National Allocation Plans.[13] The short timeframe allowed the assessment of Draft NAPs for only three Member States: Germany, the United Kingdom, and the Netherlands. The analysis focuses on the following key questions:

- Do the NAPs ensure that the national commitments under the Kyoto Protocol will be met?
- Do the NAPs stimulate the development and diffusion of low carbon-intensive technologies?

This report will identify where the Draft NAPs could work more ambitiously to meet the long-term climate targets and design allocation rules that would allow the EU ETS to achieve those emission targets at low costs to society.

Methodology and Outline

Summaries of the actual 2008-2012 Draft NAPs for Germany, the UK and the Netherlands are presented together with the NAPs for 2005-2007 in Annex A. Based on the Draft NAPs for 2008-2012:

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12 For an assessment of the innovation and efficiency aspects of the NAPs for the EU MS in the first trading period, see Schleich and Betz (2005). For a more general treatment of innovation effects in the EU ETS, see Gagelmann and Frondel (2005).

13 The authors of this report are thankful to valuable assistance by Johanna Cludius, Alejandra Sáez de la Fuente, Frieder Frasch and Michael Ruf.

- Section 2 presents the macro plans and the associated budgets for the installations covered by the Directive (ET-budget). To evaluate the MS' progress towards meeting their burden-sharing targets, Distance-to-Target (DTT) analysis is conducted. The NAPs are also evaluated in relation to medium-term and long-term climate policy targets. To assess the ambition levels of the ET-budgets for the second NAP, they are compared with verified emissions in 2005, with projected emissions for 2010 and with the size of the ET-budget for the first phase. In addition, the split of the required reductions between sectors is evaluated from a cost-effectiveness perspective. The outcomes of the verified emissions data (VAT) for the installations covered by the EU ETS for the year 2005 together with results on sector-specific analyses of surplus and shortages are presented in Annex B.
- Section 3 presents crucial allocation rules at the micro level of the NAPs and explores their implications for innovation, relying primarily on insights from basic economic theory. The rules considered are methods of allocation for existing installations and new projects, closure rules and the treatment of clean technologies.
- The concluding Section 4 then draws on the analyses presented in the previous sections and identifies areas where the NAPs for Germany, the UK and the Netherlands could be more ambitious in terms of meeting climate targets and implementing more efficient allocation rules.

2 Quantitative analysis of Draft NAPs for 2008-12 at the macro level

The EU emissions trading scheme is the climate policy instrument at the centre of the European Union's fight against climate change. In the 2005-2007 first phase of the EU ETS,[14] almost 2.2 billion EUAs are allocated each year to participants in the scheme, covering approximately 45% of the EU's CO_2 emissions, or around 30% of its overall greenhouse gas emissions (CEC 2005a). But the scheme will only contribute to the EU's effort in reaching its Kyoto reduction target of -8% compared to greenhouse gas emissions in the 1990/95 base period if Member States set stringent caps that are in line with their individual burden-sharing targets. In order to judge whether this is the case, the ETS budget needs to be compared to the burden-sharing target and Member States' distance from achieving this target.

We start our quantitative NAP assessment by looking at Member States' burden-sharing commitments, and progress toward achieving them so far. For our quantitative analysis, we use, whenever possible, greenhouse gas (GHG) data from the UNFCC national inventory reports of 2006 (UNFCCC 2006), with the most recent year being 2004. We always consider GHG emissions, excluding Land-Use Change & Forestry (LULUCF). Figure 1 shows the burden-sharing targets of Germany, the UK and the Netherlands (green bars: -21%, -12.5% and -6%, respectively), and how far they are from achieving this 2008-2012 target (yellow bars). In 2004, Germany and the Netherlands still had to further reduce their GHG emissions by -3.5% and -8.3%, respectively, while the UK had already met its target: the UK's 2004 GHG emissions were 1.3% below its base year emissions. When adding the intended governmental use of Kyoto mechanisms (KM), such as CDM and JI credits, this distance-to-target (DTT) figure improves for the Netherlands. While Germany and the UK intend to achieve their burden-sharing target by domestic action only, the Netherlands plans to buy KM credits offsetting approximately 20 Mt CO_2e/a of its yearly GHG emissions in the Kyoto period (Draft NAPs of Member States 2006). This figure is equivalent to 9.5% of the Dutch burden-sharing target, therefore increasing the Dutch target from 200.2 Mt CO_2e/a to about 220 Mt CO_2e/a in 2008-2012. Taking this number into consideration when calculating the distance-to-target in 2004, the Netherlands would have already reached its burden- sharing target (+1.2%), as demonstrated in the red bar in Figure 1. These figures need to be kept in mind when assessing the ambition level of the proposed caps for the second phase of the EU ETS.

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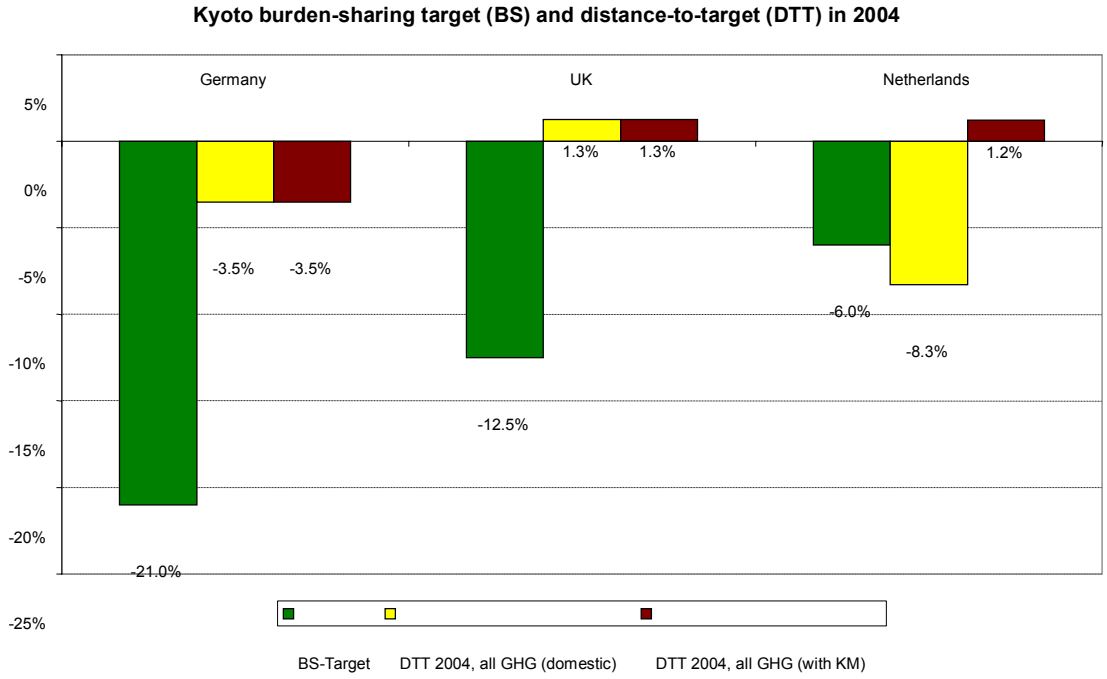
14 The words "phase" or "trading period" are used interchangeably in the report when referring to the periods 2005-2007 and 2008-2012, for which National Allocation Plans have yet to be developed.

Figure 1: Comparative analysis of Kyoto burden sharing and distance-to-target in 2004 of the Netherlands, the United Kingdom and Germany



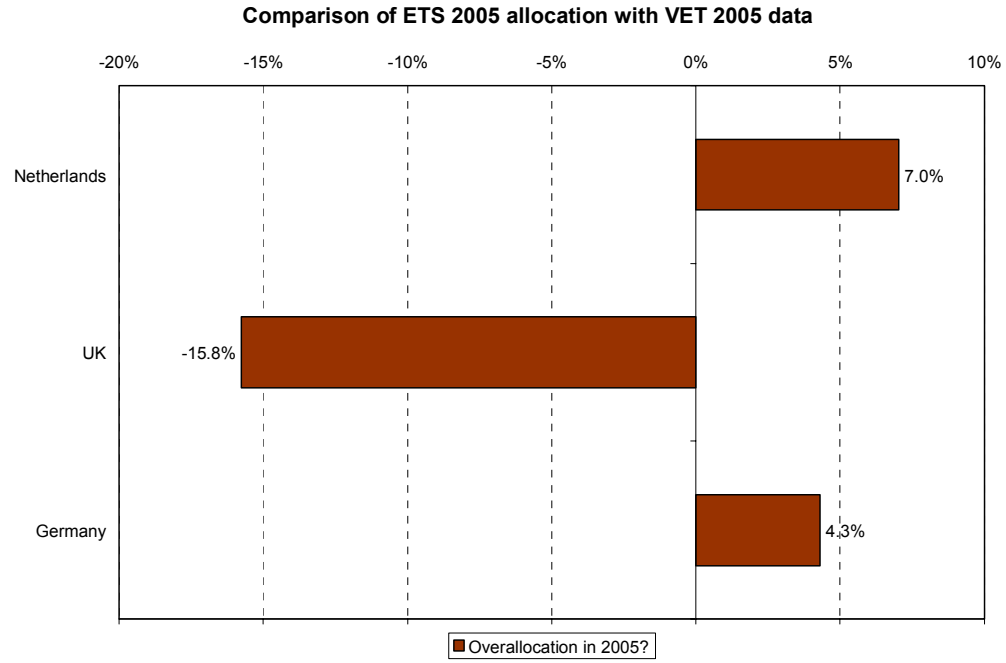
Source: Fraunhofer ISI, based on UNFCCC national inventory reports 2006 (NIR/CRF) of UK, NL and GER

The 15 May 2006 release of the emissions data (verified emissions tables – VET) of the EU ETS installations in 2005 (VET 2005) showed that the majority of Member States had set a generous cap (CEC 2006c) (see also Annex B of this report). The UK was one of the few countries for which total 2005 emissions by ET-installations were lower than the total allocated quantities of EUAs. Figure 2 shows that the amount of allowances allocated in 2005[15] was 15.8% below the actual emissions of UK installations covered by the EU ETS in 2005, or about -33 Mt CO_2e/a, indicating a stringent cap. On the other side, 2005 emissions of German and Dutch installations were below the amount allocated to them in 2005 (4.3% and 7%, respectively). This figure could still change for Germany, who intends to make ex-post corrections of its allocations to a number of installations, e.g. those who applied f according to the option rule where allocation is based on specific emission values (benchmarks) and projected output. However, this potential reduction — amounting to about half of the excess allocation —

15 This figure does not include the new entrants' reserve, or amounts set aside for opted-out installations.

will only be applied if Germany wins a court case against the EU Commission, who have forbidden any kind of ex-post adjustments to allocations.

Figure 2: Comparison of EU ETS allocation for 2005 to actual emissions of EU ETS installations in 2005



Source: Fraunhofer ISI, based on Draft NAPs II and NAPs I of GER, UK and NL as well as VET of 2005 (CEC 2006c)

2.1 Ambition level of ETS caps for the NAP 2008-2012

Assessing the stringency of the caps Member States proposed for the second phase of the EU ETS is not as straightforward as comparing actual allocation and emissions data for 2005. This is the case because data are not always complete and still subject to change. However, there are a number of criteria that help to evaluate the stringency of the ETS budget for 2008-2012. The numbers calculated based on these criteria are only indicative, and need to be interpreted with caution, but some general conclusions can be drawn from such an early assessment.

1. *ETS emissions in 2005*

First, the ETS cap can be compared to historic emissions of the trading sector. There are two sets of historic data that might be used for such a comparison: ETS sector CO_2 emissions in the country-specific base period (numbers taken from NAPs), or the actual emissions of installations covered by the EU ETS. We decided to use the 2005 VET data of the EU ETS installations, as these numbers can be better compared, are all

verified and likely to be of better quality than some of the data for the base year emissions on which Member States based their Draft NAPs. (For example, Germany is still in the process of compiling 2003 and 2004 emissions data for its base period of 2000-2005, and therefore figures in the Draft NAP only cover data for the old base period of 2000-2002.) Additionally, VET data for 2005 are available for all three countries, are most up-to-date and allow for the most objective comparison, since they do not rely on Member State-specific base periods (which may differ, e.g., 2000-2003 for the UK, and 2000-2005 for Germany and the Netherlands, where the UK and the Netherlands allow companies to pick three years out of these periods). However, there is one major caveat in comparing the 2005 VET data with the cap for the EU ETS for 2008-12: The VET 2005 data do not incorporate the extension of the scope of the EU ETS. Most Member States will include additional installations in the second trading period in an effort to harmonize the applied definition of combustion installation.[16] Also, the UK and the Netherlands have applied opt-out rules in the first phase, so that their VET 2005 data do not reflect the emissions of installations that are temporarily excluded from the scheme, but will need to be included in phase 2, since the EU ETS Directive does not foresee the option of opt-outs beyond 2007. Therefore, in order to obtain reliable results, we adjusted the VET 2005 data in two ways: First, we added the reported 2005 emissions of potential, additional installations (see figures in NAP tables), even though they are estimates subject to change. Of course, we only did so if the caps for phase 2, as stated in the Draft NAPs, already incorporated the amount of allowances to be allocated to additional installations (e.g., in the UK the cap 2 is 252 $MtCO_2e/a$, which includes opt-out installations but excludes additional installations, with which the cap could increase up to 261 $MtCO_2e/a$). Secondly, we corrected the VET 2005 figures by adding emissions of opt-out installations, as they are incorporated in the NAPs of the UK and the Netherlands. We did this by comparing the foreseen 2005 yearly allocation (stated in the NAPs) with the actual 2005 allocation (stated in CEC 2006c), taking out the new entrants' reserve. Of course, it is not certain whether actual emissions of opt-out installations are smaller than, bigger than or about the same as their original, projected 2005 allocation. Therefore, this method provides only an estimate of their 2005 emissions. Finally, since there might not have been many new entrants in 2005 and our second step excluded the unused New Entrant's Reserve (NER) of 2005, we also excluded the new entrants reserve from the ETS phase 2 cap. The aforementioned data limitations should be kept in mind when interpreting the results.

2. ETS budget of previous phase (2005-2007)

16 The NAP guidance for the second phase states that "[i]n order to remove inconsistencies in the second trading period, all Member States should therefore in any case include also combustion processes involving crackers, carbon black, flaring, furnaces and integrated steelworks, typically carried out in larger installations causing considerable emissions" (CEC 2005b, p.9).

A second criterion for assessing the size of the ETS budget is a comparison between the proposed cap for the second phase and the cap of the first phase. Though similar to a comparison between the phase 2 cap and 2005 emissions, comparing the first and second phase caps is another useful method of assessing whether the ambition level of the ETS is increasing. We do this by taking the caps for phase 1 and 2 (each including the reserve for new entrants). Both caps should equally incorporate the foreseen allocation levels for both 2005-2007 opt-in and opt-out installations (the latter is only relevant for the UK and the Netherlands, the former only for the Netherlands), but should either exclude 2008-2012 new opt-ins or adjust the cap for phase 1 by these additional emissions (only relevant for the Netherlands). Also, if the cap for phase 2 already includes the allocation to additional installations, we adjusted the cap 1 figure by the specified 2005 emissions level for these installations, thereby making both figures match (necessary only for Germany and the Netherlands, as the UK cap does not yet incorporate the allocation to additional installations). Additional installations will be included in all three Member States due to the efforts to harmonize the definition of combustion installations, but also due to additional 2008-2012 opt-ins (e.g., N_2O in the Netherlands, whose allocation, though, is not yet incorporated in the cap for the second trading period; additional installations' allocation in the UK are also not yet incorporated in its phase 2 cap). It needs to be noted that this is a rough estimate of the adjusted cap for phase 1 because we do not correct the estimated 2005 emissions of these additional installations by the compliance factor used in phase 1. Therefore, the numbers need to be interpreted with caution, but can be seen as indicative figures.

3. *ETS emissions projection 2010*

A third way to assess the ETS cap for 2008-2012 is by comparing it with emissions projections for the ETS sector for the second trading period. This criterion is also in line with the allocation method most Member States' allocation method, which is based on projections for the ETS sector. However, projection data are not always included in the NAPs. In order to make a comparison based on this criterion, we estimated the ETS sector projection for the Netherlands based on its 2010 projection for all GHG, and multiplied this number by the ETS sector's CO_2 emissions share (VET 2005 data) relative to the total GHG emissions for the Netherlands, using the most recent data for 2004 (*National Inventory Reports to the UNFCCC 2006*, UNFCCC 2006). We further assumed that this ratio will remain constant. This is a typical assumption, also used by many Member States in their NAPs. However, it should be noted that with the inclusion of additional installations, activities and gases (such as N_2O in the Netherlands), the share of the trading sector's GHG emissions relative to total GHG emissions is likely to increase, thereby increasing its projection, as well. While the determination of the ETS ratio is a crude estimate, it is still useful to look at these figures, taking them as the closest possible proxy. Unfortunately, Germany there is no recent projection for Germany, and therefore criterion 3 is only applied to the UK and the Netherlands. Their projections are compared to the proposed cap for the second trading phase.

4. Hypothetical burden-sharing budget of ETS 2010

While the first three criteria address the direction of the cap compared to past emissions and policy as well as future emissions, the fourth criterion is the only one that provides insights into the ETS sector contribution to a Member State's Kyoto burden-sharing target. This is done by comparing the cap with the hypothetical emissions target for the ETS sector for the Kyoto period 2008-2012. We obtain this hypothetical ETS burden sharing target by multiplying a Member State's burden-sharing target (all GHG, but excluding LULUCF [UNFCCC 2006 National Inventory data for 2004]) with the ETS sector's share of total GHG emissions. This ratio is determined using the most current 2004/2005 data: the ETS sector's CO_2 emissions (CEC 2006c) are divided by the total GHG emissions of a country. The same caveats stated above apply when using this ratio: We assume it is constant over time, and 2004/2005 data are thought sufficiently comparable. [17] The same procedure can be applied to calculate a proportional sectoral distribution of the burden-sharing target among different sectors. In our analysis, we are distinguishing criterion 4 as a scenario with domestic action only, and one including a Member State's intended use of Kyoto mechanisms in fulfilling its target:

a. *Without governmental use of Kyoto mechanisms*

   In the domestic action scenario we calculate the hypothetical ETS BS target without the intended governmental use of Kyoto mechanisms.

b. *With governmental use of Kyoto mechanisms*

   In a second scenario we incorporate Member States' planned purchases of CERs, ERUs and/or AAUs to meet their Kyoto burdens sharing targets. As a consequence, the hypothetical ETS BS target increases as well. This is only relevant to the Netherlands, as both Germany and UK intend to reach their burden-sharing target domestically.

All four criteria should be interpreted as first impressions of the ambition level of the ETS cap for the second trading period. The calculations will need to be updated once allocation data are confirmed and data uncertainties of opt-out and opt-in, as well as additional installations, can be eliminated. Furthermore, once the GHG emissions of the ETS sector with its expanded scope become available for 2005, the ratio of the ETS sector's emissions compared to total GHG emissions should be updated. The

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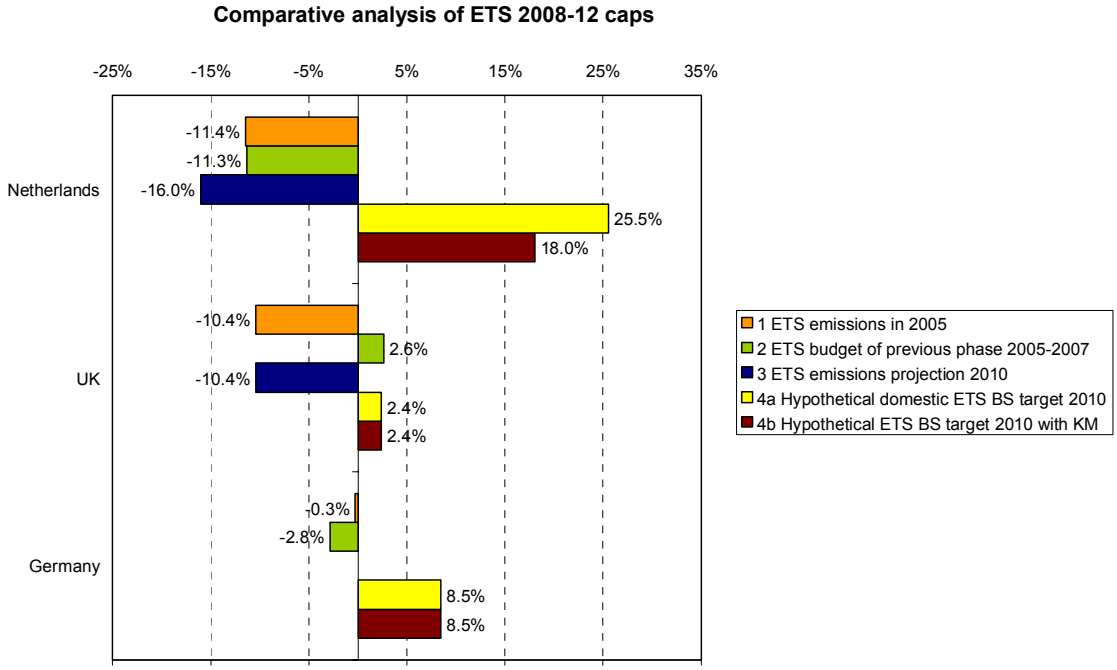
17 In particular, a more accurate hypothetical BS target for the ETS installations would have to also account for emissions by installations which will be added to the set of installations covered by the EU ETS in the second phase. However, no verified data on recent emissions by these installations is available. The same rationale applies for previously opted out installations whose emissions are not included in VET 2005 data. Therefore, the ratio of ETS to all GHG will increase and therefore also the hypothetical burden sharing target for the ETS sector. The general statements, though, still hold.

same is true once the total GHG emissions data for 2005 become available. With these limitations in mind, Figure 3 provides insight into the proposed ETS budgets for the NAP IIs of Germany, the United Kingdom and the Netherlands; it shows the results of the application of the four assessment criteria.

Figure 3: Preliminary comparative analysis of caps of the EU ETS phase 2



Source: Fraunhofer ISI, based on Draft NAPs II and NAP I of UK, NL and GER, VET of 2005 ETS emissions data (CEC 2006c)

1. *ETS emissions in 2005* (orange bar): All three Member States decreased their ETS caps compared to the actual ETS CO_2 emissions in 2005, although Germany's reduction is relatively small (Germany -3.5%, the UK -10.4% and the Netherlands -11.4%).

2. *ETS budget of previous phase 2005-2007* (green bar): The analysis shows that Germany and the Netherlands are allocating fewer allowances to the ETS sector in phase 2 compared to the allocation in the first (2005-2007) period (Germany -2.8%, the Netherlands -11.4%). On the other hand, the UK is increasing its phase 2 cap by 2.6%, which may reflect the fact that actual emissions for 2005 showed a significant shortage for the ETS installations in the UK (-33 Mio EUAs, or almost 16%) as well as the comfortable position the UK is in, currently having exceeded its burden-sharing target by 1%. However, in the light of its ambitious CO_2 emission reduction target, the UK needs to further stimulate emissions cuts and investments in clean technology in the ETS sector, which covers approximately 43% of its CO_2 emissions.

3. *ETS emissions projection 2010* (blue bar): Data for this projection were available for the UK and the Netherlands only, showing that both countries' ETS caps are well below their projection of CO_2 emissions of the ETS sector in 2010 (Kyoto period, UK -10.4% and the Netherlands -16%). Of course, this figure depends on the reliability of the projection.

4. *Hypothetical Burden Sharing Target of ETS 2010:* All three countries decided to give the ETS sector a higher-than-proportional share of the assigned amount (see also Figure 4 for Germany, Figure 5 for the UK and Figure 6 for the Netherlands). The yellow bars indicate that the Netherlands provides its ETS sector with an allocation that exceeds the proportionally distributed share of ETS to all GHG emissions by approximately 25% (*without the use of Kyoto mechanisms*), a figure that goes down to 18% when including the government's intention to use Kyoto credits in fulfilling their target (w*ith the use of Kyoto mechanisms*, red bar). Germany is also quite generous in setting its ETS cap for phase 2, giving the ETS sector an 8.5% advantage over other sectors.[18] Only the UK's proposed allocation has a close correspondence between the ETS sector's cap and its hypothetical burden-sharing target (only 2.4% above the hypothetical ETS BS target).[19] But providing the ETS sector with a higher-than-proportional share of a country's Kyoto budget is questionable, for several reasons: First, as many studies have shown, the marginal abatement costs of the ETS sector are lower than abatement costs of other sectors of the economy, such as transport and private households.[20] Thus, while the ETS enables the trading sector to cost-efficiently achieve its cap, the economy as a whole pays a premium for providing a more generous share of the Kyoto budget to the ETS sector rather than to those sectors where it is more costly to achieve emissions reductions. Second, such an approach appears unnecessary as long as companies have the option to comply with their ETS obligations by partly using CERs and ERUs, thereby providing even lower cost mitigation options (which are not available to private households, for example). This is likely to hold true even when the ratio of ETS GHG emissions to total GHG emissions increases due to the

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18 For Germany the CO_2-emission reductions required by the Draft NAP for 2010 compared to the base period 2000/2002 is actually significantly lower than the reductions promised in the voluntary agreement between the German Industry and the Government from October 2000. These reductions would be more in line with an "efficient" emissions budget.

19 If rough estimates for the emissions of additional installations to be included for the second phase are used, the relative difference between the caps and the hypothetical ETS budgets are for Germany + 6.3 %, for the UK – 0.7 % and for the Netherlands +10.7% (or +1.7 % when including the governmental use of Kyoto mechanisms). Thus, accounting for these additional effects, the distance between the actual and the optimal split becomes smaller, in particular for the UK. However, a final judgement is difficult without verified emissions data for all installations included in the second phase.

20 See for example, Böhringer et al. (2005), Criqui and Kitous (2003).or Klepper and Peterson (2005)

inclusion of additional installations. Therefore, the caps of the Netherlands and Germany, especially, should be reviewed in the light of minimizing the societal costs of fighting climate change. It is therefore worth to take a closer look at proportional distribution of Member States' emissions reduction targets.

Table 1 shows the deviation of the proposed ETS cap for phase 2 from the hypothetical ETS burden-sharing target, assuming that the reduction burden to reach the Kyoto budget is distributed proportionally across sectors. The table demonstrates that there is still room to increase the ambition level of the ETS phase 2 caps, especially for the Netherlands, where a reduction of approximately 25% (or 25 Mt CO_2e/a) would be needed to make the ETS cap correspond with the hypothetical burden-sharing target. Our analysis suggests that in Germany the cap would need to be cut by approximately 8% (or 40 Mt CO_2e/a) for the cap to equal the hypothetical ETS BS target.[21] The UK cap is closest to the hypothetical ETS BS target, but also would need to be reduced by 2% (or 6 Mt CO_2e/a) before it would correspond with the hypothetical ETS BS target. Since emissions reductions in the ETS sector are commonly considered cheaper than elsewhere in the economy, these numbers are rather conservative estimates, even though the above-mentioned reasons for a cautious analysis still apply. However, it is safe to conclude that further cuts of the phase 2 ETS budgets will most likely lead to a decrease of the overall mitigation costs of the whole economy.

Table 1: ETS phase 2 caps of Draft NAPs, hypothetical burden-sharing targets of trading sector and corresponding deviation of proposed 2008-2012 ETS cap

		Germany	**UK**	**Netherlands**
ETS Cap II (incl. NER)	Mt CO2e/a	495.50	252.00	99.20
BS Target ETS	Mt CO2e/a	453.51	245.92	73.85
Excess allocation compared to	Mt CO2e/a	41.99	6.08	25.35
equal BS contribution by sectors	%	8.5%	2.4%	25.5%

Source: Fraunhofer ISI, based on Draft NAPs II and UNFCCC national inventory reports 2006 (NIR/CRF) of UK, NL and GER

2.2 Evaluation of ETS caps compared to emission trends and targets from 1990 to 2010

In the following section, we take a closer look at the GHG emissions of Germany, the United Kingdom and the Netherlands, focusing especially on emission trends and the Kyoto target, as well as potential longer-term reduction targets and the corresponding targets for the EU ETS trading sector. Again, we used greenhouse gas data from the

21 Due to data limitations, these numbers need to be interpreted with caution, see explanation in footnote above.

2006 UNFCCC national inventory reports, where the most recent year is 2004. We have split the total GHG emissions into five groups:

- *Energy and industry* (E&I, pink striped bar): This category includes CO_2 emissions from energy combustion activities (excluding emissions from transport, private households [see categories below], commerce and others) and industrial process emissions.

- *Transport* (green bar): This category includes all CO_2 emissions from transport activities, but excludes emissions from bunker fuels (e.g., aviation).

- *Private households, commerce/services and other energy-related emissions* (Households, commerce and others, purple bar): This category includes CO_2 emissions that are commercial/institutional, residential, and of agriculture/forestry/fisheries, military as well as fugitive emissions from fuels.

- *Others* (blue bar): CO_2 emissions in this category are those from solvents and other product use, waste and others.[22]

- *Non-CO_2 greenhouse gas emissions* (Non CO_2, yellow bar): This category sums up CH_4, N_2O, HFCs, PFCs and SF_6 emissions from all sectors, i.e. all non-CO_2 Kyoto gases.

The data for these four categories are shown for 1990 (not necessarily the base year, since for some gases 1995 emissions are chosen as base year emission levels), 2000 and 2004. Also, the graph includes the country's Kyoto budget for 2010 and the proportional distribution of this target (as of 2004) among these four categories.

In addition, we depicted the proposed ETS cap for phase 2 for 2010 (orange bar), and included a line indicating the size of the hypothetical burden-sharing target for the ETS sector in 2010 (Kyoto period).[23] Finally, for the Netherlands, the red dotted line shows the hypothetical burden-sharing target for the ETS sector in 2010 when including the governmental use of Kyoto mechanisms.[24] The graphs clearly indicate — once more — that the German and Dutch ETS caps for 2008-2012 are very generous compared to the hypothetical ETS emissions target. This is especially the case in the Netherlands,

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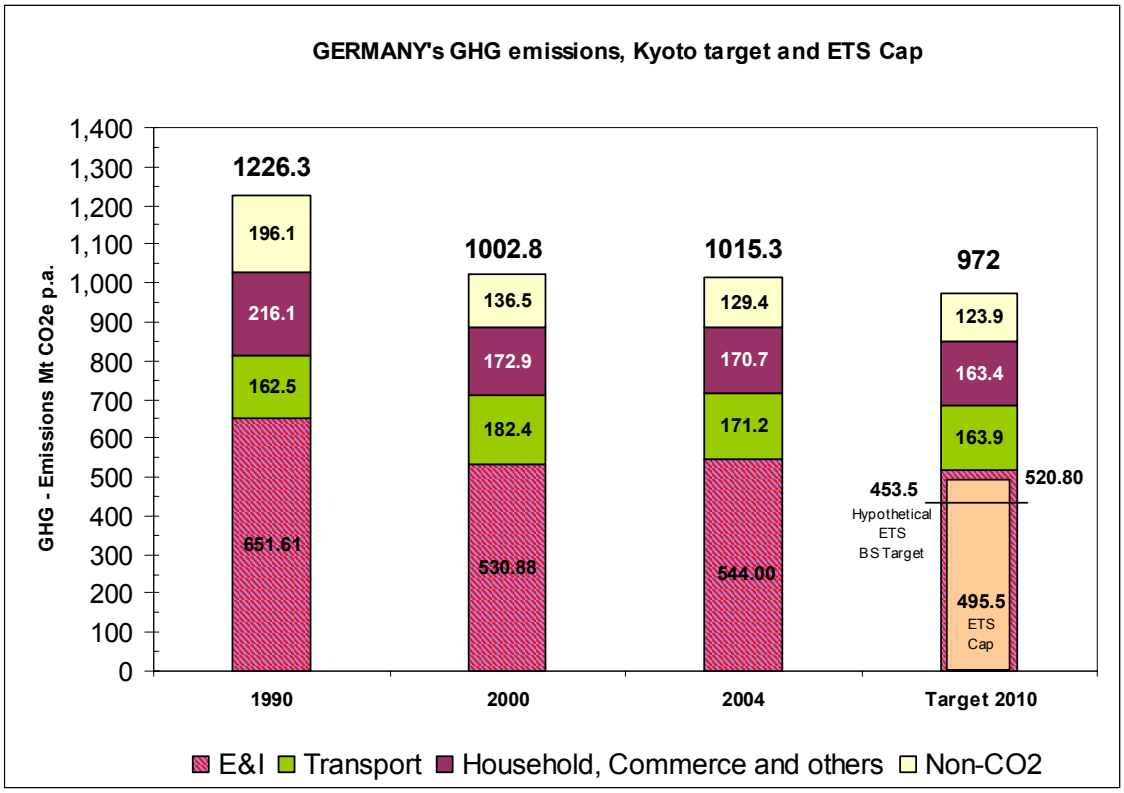
22 There are no emissions reported in this category for Germany.

23 This figure is just an estimate as it neither includes emissions from installations that opted-out of the EU ETS in phase 1 nor additional ETS installations to be included in the scheme starting 2008. We excluded these data, as emissions are not yet verified for these additional sources. Therefore, our figures are likely to slightly underestimate the hypothetical ETS targets.

24 This dotted line cannot be compared to the overall Kyoto target and the corresponding distribution among sectors as shown in the graph because the use of Kyoto mechanisms not only increases the hypothetical burden-sharing target of the ETS ,but also the overall target, as well as the share of all the other sectors.

where their proposed allocation for 2008-2012 exceeds even the E&I sector's hypothetical BS target.

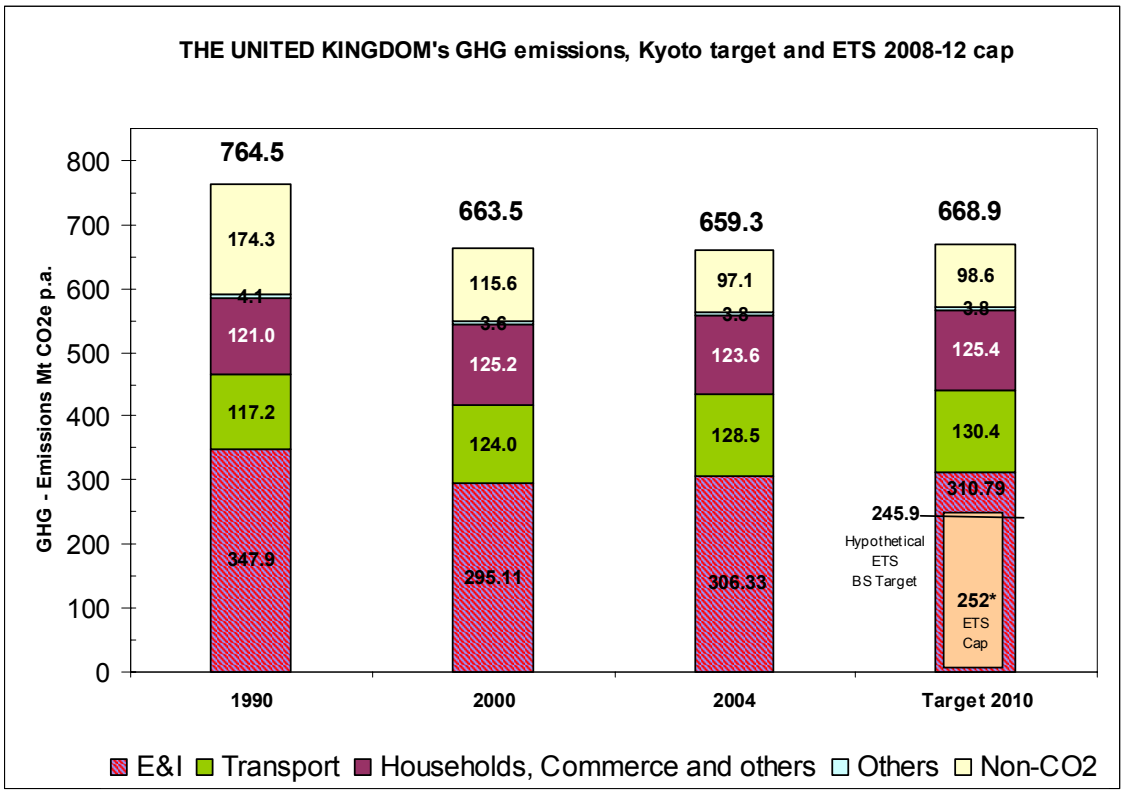
Figure 4: Germany's GHG emissions, Kyoto target, EU ETS cap of Draft NAP 2008-2012 and hypothetical ETS burden-sharing target (no state use of Kyoto mechanisms)[25]



Source: Fraunhofer ISI, based on NIR / CRF 2006 for Germany; UNFCCC 2006; German NAP 2008-2012; VET 2005 for ETS in Germany (CEC 2006c)

25 Germany's Draft NAP II states (on p. 43 et seq.) a different hypothetical ETS BS target than the one we calculate based on UNFCCC 2006 data, rather than using the German Energy Balances, as was done for the German NAP.

Figure 5: The United Kingdom's GHG emissions, Kyoto target, EU ETS cap of Draft NAP 2008-2012 and hypothetical ETS burden-sharing target (no state use of Kyoto mechanisms)[26]



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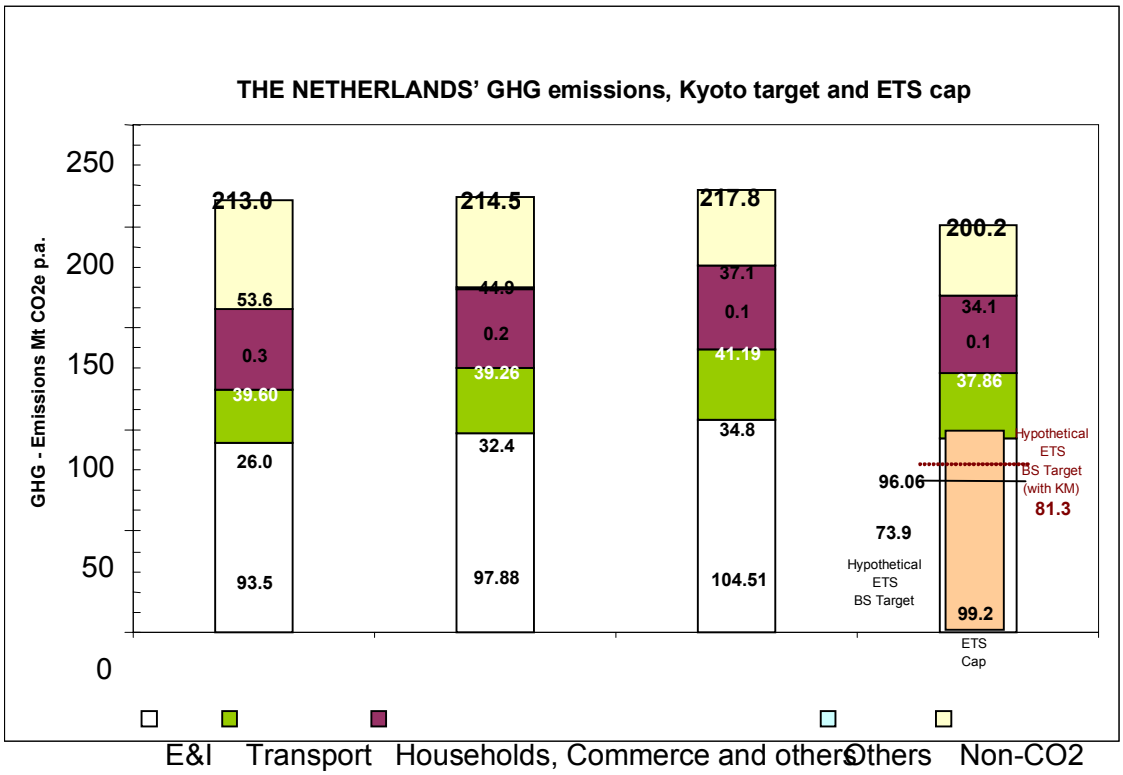
Source: Fraunhofer ISI, based on NIR / CRF 2006 for UK; UNFCCC 2006; UK NAP 2008-2012; VET 2005 for ETS of UK (CEC 2006c)

26 The UK ETS cap for phase 2 does not yet include additional installations but already covers previously opted-out installations. If the draft NAP estimate for emissions of additional installations were used, the hypothetical ETS burden sharing target would increase to ca. 254 Mt CO_2e/a, while the UK ETS cap is considered to be extended up to 261 Mt CO_2e/a.

Figure 6: The Netherlands' GHG emissions, Kyoto target, EU ETS cap of Draft NAP 2008-2012 and hypothetical ETS Burden sharing target (with and without use of Kyoto mechanisms [KM])[27]



Source: Fraunhofer ISI, based on NIR / CRF 2006 data for the Netherlands; UNFCCC 2006; Dutch NAP 2008-2012; VET 2005 for ETS in the Netherlands (CEC 2006c)

The data shown in the graphs are also depicted in Table 2 (Germany), Table 3 (the UK) and Table 4 (the Netherlands). In these tables, we added fictitious GHG emission reduction targets for 2020 and 2050 (compared to the Kyoto base period). For 2020, we assumed a target of -30% (in line with recommendations by the European Council of -15% to -30%) and for 2050 a target of -80% (in line with recommendations of -60% to -80%), both relative to the Kyoto base period 1990/95. These numbers are necessary in order to achieve the 2 degree target. We chose these years and reduction targets — rather than country-specific goals, such as -40% by 2020 for Germany[28] — to

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27 The Netherlands hypothetical ETS burden sharing target increases to approx. 89 Mt CO_2e/a (or 97 Mt CO_2e/a, with KM) when calculated with preliminary data for additional installations.

28 For comparison, the "hypothetical" budget in 2020 for the German ETS sector under the 40% reduction scenario would be about 345 M t CO_2e/a.

make the numbers comparable across countries.[29] We distributed these fictitious targets proportionally across sectors, assuming a constant share of GHG emissions with respect to 2004/2005. The numbers, especially those for the EU ETS in its current scope, impressively show that these long-term targets can only be achieved through fundamental reductions of GHG emissions: Germany's hypothetical ETS emissions target for 2010 would have to be further reduced to approximately 400 Mt CO_2e by 2020 and to around 115 Mt by 2050. The United Kingdom's hypothetical ETS emissions target for 2010 would have to be reduced to 200 Mt CO_2e by 2020 and to 56 Mt by 2050. The Netherlands' hypothetical ETS emissions target for 2010 would have to be lowered to 55 Mt CO_2e by 2020 and 15 Mt by 2050. This highlights the importance of setting incentives within the EU ETS so that the ETS sector will be on track and prepared to meet these long-term targets. Today's caps and allocation rules, especially those for new entrants, need to be considered in light of trying to meet these same targets, and should reflect the deep cuts represented here. However, current NAPs do not support such a development, as can be seen in the analysis of the micro-plans of the phase 2 NAPs of Germany, the UK and the Netherlands. This is particularly troublesome considering that in phase 2 a significant share of capital in the power sector will need to be replaced, opening up a window of opportunity for a change towards low-carbon technologies. Current draft NAPs jeopardize these opportunities.

Table 2: GHG emissions path and implications of potential long-term targets for Germany

	1990	2000	2004	Target 2010	Potential Target 2020	Potential Target 2050
					-30%	-80%
E&I	651.61	530.88	544.00	520.80	461.47	131.85
Transport	162.5	182.4	171.2	163.9	145.21	41.49
Household, Commerce and others	216.1	172.9	170.7	163.4	144.77	41.36
Others	0.0	0.0	0.0	0.0	0.00	0.00
Non-CO2	196.1	136.5	129.4	123.9	109.78	31.37
Total	1,226.3	1,022.8	1,015.3	972.0	861.24	246.07
ETS Cap				495.5		
Hypothetical ETS Target				453.5	401.84	114.81
Hypothetical ETS Target (with KM)				453.5		

Source: Fraunhofer ISI, based on NIR / CRF 2006 for Germany; UNFCCC 2006; German NAP 2008-2012; VET 2005 for ETS in Germany (CEC 2006c)

29 Clearly, these analyses are hypothetical scenarios only and are not based on any kind of burden-sharing across EU MS to achieve a given emission reduction target at the EU level.

Table 3: GHG emissions path and implications of potential long-term targets for the UK

	1990	2000	2004	Target 2010	Potential Target 2020	Potential Target 2050
					-30%	-80%
E&I	347.9	295.11	306.33	310.79	248.63	71.04
Transport	117.2	124.0	128.5	130.4	104.29	29.80
Households, Commerce a	121.0	125.2	123.6	125.4	100.34	28.67
Others	4.1	3.6	3.8	3.8	3.05	0.87
Non-CO2	174.3	115.6	97.1	98.6	78.84	22.53
Total	764.5	663.5	659.3	668.9	535.15	152.90
ETS Cap				252.0		
Hypothetical ETS Target				245.9	196.74	56.21
Hypothetical ETS Target (with KM)				245.9		

Source: Fraunhofer ISI, based on NIR / CRF 2006 for UK; UNFCCC 2006; UK NAP 2008-2012; VET 2005 for ETS of UK (CEC 2006c)

Table 4: GHG emissions path and implications of potential long-term targets for the Netherlands

	1990	2000	2004	Target 2010	Potential Target 2020	Potential Target 2050
					-30%	-80%
E&I	93.5	97.88	104.51	96.06	71.54	20.44
Transport	26.0	32.4	34.8	32.0	23.84	6.81
Households, Commerce and others	39.60	39.26	41.19	37.86	28.20	8.06
Others	0.3	0.2	0.1	0.1	0.10	0.03
Non-CO2	53.6	44.9	37.1	34.1	25.41	7.26
Total all 6 GHG	213.0	214.5	217.8	200.2	149.07	42.59
ETS Cap				99.2		
Hypothetical ETS Target				73.9	55.00	15.71
Hypothetical ETS Target (with KM)				81.3		

Source: Fraunhofer ISI, based on NIR / CRF 2006 data for the Netherlands; UNFCCC 2006; Dutch NAP 2008-2012; VET 2005 for ETS in the Netherlands (CEC 2006c)

The figures and analyses presented imply that if future emissions develop like emissions of the past, emission reduction targets of 30% and 80% will not be met in the future.

3 Analysis of allocation rules at the micro level

This section analyses the allocation rules at the micro level of the NAPs, which are important for innovation effects. Based primarily on arguments from economic theory, allocation rules are identified which help the EU ETS move MS toward reducing greenhouse gas emissions at the lowest possible costs to society.

3.1 Free allocation versus auctioning

In principle, allowances may be allocated for free or auctioned off to participants.[30] For the second trading period (2008-2012), the Emissions Trading Directive (CEC 2003b) states that 10% of allowances, at most, can be allocated through an auction; for the first trading period, this share was 5% of allowances. While the method of allocation does not — at least under ideal conditions assuming the absence of market power — affect the market price for EUAs, participating companies are better off if allowances are allocated for free, since their wealth increases by the total value of these allowances. Auctioning off all allowances could avoid most, if not all, problems and distributional aspects, such as early action, windfall profits or rules for new projects and closures. Distributional aspects in particular dominated the processes that led to the first NAPs in most EU MS, and are the source of several counterproductive rules in the EU ETS.[31] Thus, if all allowances were auctioned off, the NAPs would be much simpler, more transparent and more effective. In addition, the outcome of an auction may be perceived as "fair" because - in contrast to a free allocation of allowances — the "polluter-pays principle" holds.

Auctioning off allowances would also address "windfall profits." Just as companies try to pass on any additional marginal costs (opportunity costs) associated with emissions (i.e., price of allowances) to customers, extra profits (windfall profits) accrue if allowances are allocated for free. Opportunity cost pricing is not only sensible from an economic perspective, it is also essential for an ETS to send the correct price signals in order to provide adequate incentives to save emissions and to minimize total reduction costs.[32] In principle, whether allowances are auctioned off or allocated for free does not alter the opportunity costs (of additional emissions), but leads to very different outcomes in terms of the distribution of the scarcity rents associated with the allowances. The power sector managed to pass on a large part of the opportunity costs to its cus-

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30 Allowances may also be sold at a fixed price; however, participation would have to be rationed according to some rule as long as this fixed price remains below the (expected) market price.

31 These problems include, among others, early action, rules for new entrants and ex-post adjustments (e.g., in Germany in NAP 1).

32 From this perspective any attempts to directly regulate the price for EUAs, for example by setting a cap, would be counterproductive.

tomers, in particular because demand for electricity is fairly inelastic (at least in the short run).[33] As a consequence, the power sector secured high windfall profits. Estimates of the pass-through rates are generally high. These rates vary between 60 and 80%, depending on the country, market structure, demand elasticity and CO_2 price considered (Sijm et al. 2006). Windfall profits would disappear if allowances were auctioned off, and auction revenues could then be used for other purposes. Thus, in the long run, the EU ETS should strive for an auction share of 100%. To phase in a fully auctioned system, the auction share for the second trading period could be set to the maximum allowed by the Emissions Trading Directive (CEC 2003b), that is to 10% of the emissions trading budget. Auctioning off a small part of the budget right at the beginning of the trading period may also generate robust early price signals for the actual scarcity in the market, since participants base their bidding behaviour on their marginal abatement costs. Hence, the auction would generate an early price indicator, which may help participants develop their investment and trading strategies and may improve the efficiency of the system (see also Ehrhart et al. 2005).

Concluding summary of main points:

- In the long run all allowances should be auctioned off.
- For the trading period of 2008-2012, Member States should set share of allowances to be auctioned off at the maximum level allowed by the Directive, that is at 10% of the total budget.
- Auctioning allowances would reduce windfall profits.
- Auctioning and free allocation are expected to have identical effects on output prices.

3.2 Benchmarks versus grandfathering for existing installations

As long as full auctioning is not feasible, other allocation rules have to be used. The most common approach is to allocate allowances to existing installations according to their historical emissions in a fairly recent reference period ("conventional grandfathering").[34] However, conventional grandfathering may lead to undesirable distributional effects, since companies investing in abatement measures prior to this period (early action) receive fewer allowances than those who did not invest in such measures. The

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33 From a theoretical perspective, market power may result in higher or lower increases in the product price in response to the introduction of the EU ETS compared to perfect competition. The outcome depends on, among other things, the shape of the demand curve.

34 For the first trading period (2005-2007) most EU Member States used grandfathering (for overviews see Betz et al. [2004], Ecofys [2004], Matthes et al. [2005] or DEHSt 2005]).

latter companies are then able to reduce emissions at lower costs and sell the surplus allowances on the market. This problem will arise in future trading periods if base periods are updated to calculate allocation at the installation-level.

Alternatively, allocation could be made based on benchmarks, i.e., on specific emission values per unit of production (e.g., kg CO_2/MWh electricity or t CO_2/t cement clinker) for a particular group of products or installations. For distributional reasons, benchmarks based on average specific emission values per unit of production (average benchmarks) may be politically more feasible for existing installations.[35] The actual number of allowances can be derived from the specific benchmark value per unit of activity multiplied by the past or predicted activity rates of the individual installations. In general, a benchmarking allocation favours carbon-efficient installations compared to less carbon-efficient installations, since operators in the latter category need to purchase missing allowances on the market or have fewer excess allowances. To limit the distributional effects, the benchmarks used for existing installations could be differentiated according to fuel use, technologies, installation size or application (e.g., load). While such differentiated benchmarks are likely to result in efficiency losses and higher overall mitigation costs, these losses would be smaller for existing installations (compared with new installations).

In the EU ETS, benchmarking could also provide additional incentives for modernization (compared with conventional grandfathering).[36] For installations receiving fewer free allowances under benchmarking than under conventional grandfathering, benchmarking provides a higher incentive for substitution of inefficient installations if closures of installations lead to a termination of allocation (see also Cremer and Schleich 2006). The tighter the benchmark, the higher this incentive would be. Finally, benchmarking would facilitate comparison across EU MS, a possible first step towards harmonized allocation rules throughout the EU (Kruger and Pizer 2004). In fact, EU-wide benchmarks — possibly developed in coordination with business associations — could also be used to determine the allowance budget at the level of sectors. Such a procedure would contribute to levelling the playing field for allocation.

The potential drawbacks of benchmarking include more stringent data requirements and the need to build benchmark groups (see Radov et al. 2005). Distributional effects, which may be high even if differentiated benchmarks are used, may render benchmarks politically infeasible.[37] In the guidelines for the second trading period, the Commission stated that “EU-wide benchmarking is not a sufficiently matured allocation

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35 Benchmarks based on the specific CO_2 emissions of the best available technology (BAT-benchmarks) would be more appropriate for new entrants.

36 Incentives to reduce emissions are the same under a benchmarking allocation and conventional grandfathering.

37 See Cremer and Schleich (2006) for an empirical analysis of the distributional effects of different benchmarking rules for the German power sector.

method to be used for the second phase. Member States may however find appropriate use for benchmarking at the national level for the installation level allocation in certain sectors and for new entrants, e.g. in the electricity sector." (CEC 2005b, p. 8). The power sector, which is responsible for the vast majority of emissions in the EU ETS, seems particularly well suited to benchmarking, since its output is fairly homogenous and it is easy to assign installations to benchmarking groups.

Concluding summary of main points:

- To address early action and provide incentives for replacement of inefficient technologies, gratis allocation for existing installations should be based on product-specific benchmarks for sufficiently homogenous product groups.
- Undifferentiated benchmarks would provide the highest incentives for the replacement of inefficient technologies.

3.3 Allocation rules for new projects

Neither the Emissions Trading Directive nor the NAP guidelines make any recommendations about how new projects (i.e., new installations and capacity extensions of existing installations) should be treated.[38] In principle, three methods are acceptable under the Directive: auctioning, a purchase of EUAs on the market or free allocation (from the reserve for new entrants). However, the logic of emissions trading requires that all allowances for new projects be purchased at market prices, ensuring that investment decisions are based on the full social costs (i.e., private costs plus environmental cost). Allocating free allowances to new projects amounts to subsidizing investments (and output)[39], increasing — ceteris paribus — the costs of achieving climate targets.

If newcomers have to buy allowances on the market or through an auction, there are strong monetary incentives to implement energy-efficient technologies that require the purchase of fewer allowances. In contrast, if new projects receive free allowances, the incentives to use the most cost-efficient technologies are weaker and depend on the actual allocation rules.[40] As a second-best solution, the allocation for new projects could be based on uniform Best Available Technology benchmarks and standardized projections of production or utilization rates for homogenous products. In this case,

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38 Even though the Commission would have preferred newcomers to buy allowances on the market, e.g. European Commission DG Environment (CEC 2003a).

39 See Graichen and Requate (2005), Spulber (1985) or the Council of Environmental Advisors to the German Government (SRU 2006).

40 In the first trading period (2008-2012), all MS established a New Entrant Reserve (NER) to allocate allowances to new projects for free, often on a first-come-first-served basis. Exceptions are non-CHP plants in the Swedish power sector, which have to buy all their allowances on the market.

there are strong innovation incentives to invest in the most efficient technology within a given product group, independent of the level of the benchmark. Investments in technologies that produce fewer specific emissions than the benchmark generate extra allowances, which may be sold on the market. By contrast, technologies that are less efficient than the benchmark create additional costs for the purchase of allowances. Any further differentiation (e.g., by fuels, processes or by utilization rates) implies additional subsidization of particular installations and further reduces the cost-saving potential of the EU ETS.[41] In particular, the more sub-benchmarks there are within a product group or within a technology group, the smaller the innovation effects, since innovation incentives are limited to the sub-groups.

Concluding summary of main points:

- Allocating allowances for free to new projects amounts to subsidizing output and increases the overall societal costs of achieving emission targets.
- New projects should acquire needed allowances at market prices.
- If new projects receive allowances for free, allocation should be based on BAT-benchmarks and standardized load factors.
- Differentiating benchmarks or load factors (e.g. by technologies or fuels) results in distorted incentives for innovation, subsidies for particular technologies or fuels and eventually higher overall reduction costs for society.
- Undifferentiated benchmarks would provide the highest incentives for the replacement of inefficient technologies.

3.4 Allocation rules for closures

The Emissions Trading Directive requires that allowances can only be allocated to installations that operate under a permit to emit greenhouse gases (Article 11 in combination with Article 4, CEC 2004b). Thus, if closed installations cease to adhere to the permit or do not have a permit at all, the issue of allowances stops. However, taking away allowances for closures results in (economic) inefficiencies and disincentives for new investments. If closure leads to a cessation of an installation's allocation, old plants may continue to operate for too long and new investments may be postponed, because the opportunity costs of a closure are not accounted for properly. In fact, economic theory suggests that stopping allocation for closures subsidizes output, since there will be too many companies in the market (Graichen and Requate 2005, Spulber

41 For the first trading period in most MS, allocation for new projects is typically based on BAT-values or BAT-benchmarks for homogenous products (or technologies). Benchmarks for product groups are used, in particular, in the energy sector, but usually differentiated by technologies and/or fuels (see Schleich and Betz 2005, or DEHSt 2005 for an overview).

1985).[42] In the first trading period, most MS decided that once an installation has been closed there should be no further issuance of allowances for the remainder of the period. To provide additional incentives for new investments, some MS, like the UK, the Netherlands and Germany, permit the transfer of allocated allowances from closed installations to new ones.

Concluding summary of main points:

- From the perspective of economic efficiency, installation closures should not result in termination of allocation.
- Transfer rules may provide additional incentives for new investments.

3.5 Treatment of clean technologies

Since the EU ETS focuses on combustion installations, renewable energy technologies like wind power, hydro and photovoltaic installations are not directly covered by the EU ETS. Therefore, no direct innovation effects can be expected for these technologies. At best, renewable energy technologies may benefit indirectly, if the EU ETS results in a sufficient increase in the costs of conventional power (and heat generation), making renewable energies (RES) more competitive. However, a substantial increase in electricity prices is required in order to drive incentives for renewable energy technologies (Wuppertal Institut für Klima, Umwelt und Energie 2006). The only renewable technologies that may be directly supported by the NAPs are biomass- or waste-based combustion installations, if their rated thermal input exceeds 20 MW. However, some countries, like Germany, have excluded such installations from the EU-ETS. If these installations were included and received allowances (e.g., via benchmarking) they may benefit twice: From the EU ETS and from specific support systems like feed-in-tariffs. Otherwise, they will have to bear transaction costs to comply with the provisions set by the Emissions Trading Directive and subsequent regulations at EU or national levels. Other countries, like the UK, have included such installations and set incentives for the use of clean fuels, e.g., the use of a uniform benchmark for new entrants based on gas. Thus, investors in biomass or waste material will be able to sell their surplus allocation. In sum, the EU ETS is not expected to particularly enhance the diffusion of RES-technologies and therefore other, more direct national support mechanisms, such as

42 For example, the U.S. EPA Acid Rain program for SO_2 and NO_x from power plants is governed by more efficient allocation rules for closures, and also for new entrants: Closure of a plant will not terminate allocation, and new projects need to purchase allowances on the market or via auctions. Linking allocation to operators, as is practised in this program, would facilitate more efficient rules for closures and new entrants in the EU ETS.

feed-in tariffs, (tradable) quota systems or direct R&D subsidies, need to remain in place.

The EU ETS does not directly favour a particular technology, such as combined heat and power. Instead, the price and cost incentives favour a variety of energy/carbon-saving technologies. However, allocation rules for newcomers could be used to support particular technologies. In fact, based on allocation criterion 9, some countries decided to include special provisions for clean technologies, such as new combined heat and power (CHP). Because fuel is used more efficiently, CHP plants exhibit lower emissions compared to situations where both heat and electricity are generated in separate installations.

Concluding summary of main points:

- Benchmarking allocation would directly favour renewable energy technologies that are covered by the Directive (i.e., biomass- and waste-based installations). Conventional grandfathering would leave those installations with transaction costs only, but no direct benefits.
- Renewable energy installations benefit indirectly from the EU ETS because generation costs of fossil fuel-based technologies increase.
- To accelerate the diffusion of renewable technologies or CHP, other, more direct support mechanisms might be necessary

4 Conclusions

This section presents conclusions the Netherlands based on analyses at the macro and micro levels of the Draft NAPs of Germany, the Netherlands and the UK, as well as on the results of verified emissions data for installations from 2005. It identifies areas where the NAPs could more ambitiously meet the long-term climate targets and design allocation rules that would allow the EU ETS to achieve those emission targets at low costs to society.

4.1 Macro level

Short term

With respect to the short-term (2008-2012) emission targets, data from the latest National Inventory Reports for 2006 together with the Draft NAPs suggest that:

- In Germany, greenhouse gas emissions were significantly reduced between 1990 and 1998 — partially thanks to “wall-fall profits” i.e., the reconstruction and modernization of the energy and industry systems in former East Germany[43]. Since then, however, emissions have been increasing in the power sector, and stagnating overall. Germany appears to be prepared to meet its burden-sharing target on its own, but additional efforts are now required to close the remaining gap of 3.5%.
- The UK realized significant reductions in greenhouse gas emissions, also thanks to special circumstances in the early 1990s, when the liberalization of the energy markets led to a "dash for gas" in the power sector. Since then, total emissions in the UK have been relatively stable. The UK is clearly on track to meet its burden-sharing target on its own.
- In the Netherlands, current CO_2 emission levels are even higher than in 1990, and the burden-sharing target will only be met through significant reductions of non-CO_2 emissions and by relying heavily on the use of the Flexible Mechanisms of the Kyoto Protocol: 50% of the reductions needed to achieve the burden-sharing target have to be financed by the federal budget for purchasing

43 See Schleich et al. (2001) for a quantitative analysis of the wall-fall profits.

credits from JI and CDM-projects. If prices for these CERs and ERUs continue to increase, this budget will have to be adjusted upward.[44]

Mid- and long-term

With respect to the mid-term and long-term emission reduction targets of 30% and 80%, respectively, our extrapolation analyses imply:

- For emission reductions of -30% by 2020 and -80% by 2050, Germany's hypothetical ETS emissions target would need to be approximately 400 Mt CO_2e by 2020 and around 115 Mt CO_2e by 2050; the required ETS-emission target of the UK would be around 200 Mt CO_2e in 2020 and 55 Mt in 2050; and the Netherlands' hypothetical ETS emissions target for 2020 would be roughly 55 Mt CO_2e by 2020 and some 15 Mt CO_2e by 2050.[45]
- If emissions continue to develop as they have over the last five years, Germany, the UK and the Netherlands will be far from achieving the mid-term and long-term indicative reduction targets.
- The emission targets implied at the macro level suggest that Germany, the UK and the Netherlands did not use the NAPs to lead their economies on a reduction path towards these mid-term or long-term targets. To get there, they will have to be significantly more ambitious.
- More stringent allocation plans for the second phase would result in higher future prices for EUAs, which would mean additional financial incentives to invest in carbon-efficient technologies early on. If reduction efforts are postponed for too long and sudden emission reductions become unavoidable for ecological reasons, total (i.e., inter-temporal) reduction costs for society may be much higher (due to that fact that sudden changes to the economy and its technological infrastructure are associated with higher costs, when compared to a smoother transition).

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44 In the National Budget 2006 it is stated that for the period 1998 to 2011 € 340 mio is reserved for JI credits, and € 402 mio for CDM credits. So, in order to purchase the necessary credits for around 100 Mton CO2, this budget implies a specific average price of € 7/ton CO2.

(see:http://rijksbegroting.minfin.nl/default.asp?CMS_ITEM=6B621CAE8AFA4F3F93AD1A074A965065X727X50991X61). The Dutch government announced in April 2006 that due to market price increases and delay in project delivery € tens of mio's more will be reserved to ensure the purchases.

45 These figures are based on the current scope of the EU ETS, but as it is going to be extended (including both additional installations as well as currently opted out installations), the numbers – once verified data becomes available – will need to be adjusted, thereby slightly increasing the hypothetical targets for the ET-sector.

- By reducing investment uncertainty, policy makers can accelerate the structural change in energy and industry technologies and infrastructures necessary to meet long-term climate targets. They should set credible long-term emission targets and implement policies that will allow these targets to be met.

Ambition level of Draft NAPs

Analyses of the ambition levels of the ET-budget for Draft NAPs for 2008-2012 show that:

- Germany and the Netherlands decrease the ET-budget for the second phase compared to the first phase, but the implied reduction for Germany is rather small.
- The UK and the Netherlands decrease the ET-budget compared to projected emissions of the ET-installations; if the projected growth rates turn out to be correct, the implied reduction is about 10% for the UK and approximately 16% for the Netherlands.
- The Netherlands intends to apply a compliance factor of 0.86, implying that the second NAP looks more stringent than the first NAP, which used 0.97 as its compliance factor. The flexibility to choose the best out of five reference years (2001-2005) may have led to inflated reference emission levels.[46]
- Germany, which did not provide projections for emissions and ended with a rather large surplus allocation in 2005, highlights the importance of using emission projections to determine the size of the ET-budget. Thus, Germany should also provide emission projections for NAP 2.

ETS versus non-ETS sectors

Our analyses of the size of the emission budgets for the ETS-sectors and the non-ETS-sectors suggest that:

- In all three MS, the budgets for the ET-sectors are too high, in particular in Germany. Thus, compared to the optimal split, the current budgets benefit companies with ET-installations at the expense of the other sectors (private households, transport), and overall reduction costs for society are too high.
- To lower societal costs in the second phase, the ET-sector should receive a relatively smaller share of the budgets compared to the first phase.

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46 CO2 Emissiehandel Nieuwsbrief, June 19th, 2006.

Verified Emissions in 2005

The verified emissions data for 2005 were a first check on the ambition of the NAPs for the first trading period, and of the potential for a more ambitious allocation in the second phase. General results and additional analyses for the three Member States lead to the following findings:

- The surplus of 44 Mio. EUAs in 2005 suggests that, on average, allocation was fairly generous in the MS. Unless there is major economic growth, it seems quite likely that a surplus of allowances will also emerge in 2006 and 2007. In this case, the price for EUAs would be expected to drop further, since banking into the next phase is not allowed,[47] and the EU ETS would then provide few incentives for energy efficiency or innovation, defeating its very purpose.
- Of the countries analyzed in this report, the VET data imply that only the UK had a stringent allocation, while the surplus was largest in Germany in absolute terms (21 Mio. EUAs) and in the Netherlands in relative terms (about 7% compared to verified emissions). The results for Germany and the Netherlands suggest that a larger reduction than required by the ETS budget for the first trading period would have been feasible.[48] The Netherlands knew this in advance, but granted credit for early action, which was achieved under the benchmark and energy efficiency covenants.
- In the UK and the Netherlands, energy-installations were generally short (relying more on coal than anticipated because of high gas prices in 2005); this was not the case in Germany, however, where identical compliance factors are in place for energy and non-energy installations. Installations from all other sectors were long in all three countries. Since Germany also plans to apply a stricter compliance factor for energy installations in the second phase, energy installations may be short in all three MS. Empirical evidence suggests that in the Netherlands, gas-fired CHP is being used less often. Likewise, one large refinery had a major shut-down.
- In the Netherlands, there is some indication that projected growth in certain sectors (in particular in the iron and steel sectors, but also in manufacturing) was high compared to actual economic development, which resulted in a high surplus of EUAs. In the next phase, growth projections may have to be checked even more carefully; the application of a national growth figure of 1.7% may be useful, but not necessarily conservative enough. In any case, ambitiousness of the budget will be determined by the compliance factor.

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47 See Schleich et al. (2006) for an assessment of the banking provisions in the EU ETS.

48 This sharp decline in emissions in the ETS installations comes as a surprise, in the light of the slight upward trend in the energy and industry sectors in Germany in recent years.

- For the Netherlands, allocation in the first phase had regressive effects: Smaller installations received a relatively lower surplus/higher deficit than larger installations. Upon additional analysis of the underlying reasons, this may have to be addressed in the second phase.
- In Germany, about half of the surplus came from installations where allocation is based on the options rule (emission value multiplied by expected output). It is therefore particularly important not to introduce a similar allocation rule into the second NAP at the final minutes, as was the case for the first NAP.

4.2 Micro level

The trading of emissions by itself does not reduce emissions. But, if designed properly, the EU ETS can contribute to achieving emission reduction targets at low costs. Based on the arguments derived from economic theory and from empirical evidence, we conclude the following:

Auctioning

- In all Member States the auction share should be set at the maximum possible level of 10%. While Germany does not intend to introduce an auction, the UK and the Netherlands intend to do so in the second phase. For the UK, the auction share should be set at the maximum level of the given range of 2%-10%. The Netherlands plans to auction a share of 4 %, which corresponds to 10% of the allocation of the power sector.[49] The auction share for the power sector (or sectors which manage to pass on a large share of the additional costs) could be raised to 10% of the overall allocation.
- Since the power sector proved particularly able to pass on the additional costs of the EU ETS, the auction share should be taken primarily from the "intended" budget of the power producers to address windfall profits. In the Netherlands, this will specifically be the case.

Windfall profits and competition

- In the political debate in all countries, the question of how to best address windfall profits got mixed up with the issue of competition. While windfall profits may be the consequence of the free allocation of allowances, higher output prices (e.g., electricity prices) are the consequence of the EU ETS putting a price tag on carbon. Windfall profits are an issue that should be dealt with in the NAPs, e.g., through tighter allocation for those companies benefiting from free allocation. Higher output prices are is an intended effect of the EU ETS and should be independent of the allocation method. The EU ETS changes the

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49 Thus, the overall cut of 4% represents 2/3 of the 15% budget cut for the power sector as a measure to address windfall profits.

relative prices of factors of production, and thus necessarily affects competition: Carbon-intensive production should become relatively more expensive. The effect on output prices, however, should be the same whether allowances are allocated for free or auctioned off. Since the source of windfall profits rests in the method of allocation, the issue of windfall profits should be addressed in the NAPs. By contrast, the issue of competition is not affected by the allocation method of allowances.[50,51]

- Competition may be distorted if electricity-intensive industries, like the aluminum industry, compete internationally with companies from countries where there is no climate policy in place. Production may then shift to those countries and total emissions may actually increase if production processes abroad are more carbon-intensive (leakage effects). Most existing studies, however, indicate that the distortionary effects of emissions trading are lower than for other instruments.[52]
- To reduce windfall profits in the power sector, Germany changed its allocation philosophy (compared to the NAP for 2005-2007) and now requires a higher reduction of 0.85 from energy installations, compared to 0.9875 for other installations. But even with a cut of 15%, windfall profits are likely to be quite substantial and could be honed still further, via auctioning, for example.
- Since windfall profits are also subject to corporate (and other) taxes, not all additional revenues translate into an equal increase in net profits for companies. Thus, at least to some extent, taxation may effectively reduce windfall profits. The relative effectiveness of both taxation and auctions also depends on national tax laws.

Using benchmarks for existing installations

- If auctioning is not feasible, benchmarks should be used for allocation to existing installations for sufficiently homogenous products (like electricity). In particular, benchmarks account for early action and may provide higher incentives for modernization. These incentives would be higher for uniform benchmarks than for differentiated benchmarks (e.g., by fuels or technologies). They would also be higher for BAT-benchmarks than for average benchmarks.[53]

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50 Of course, the impact on competition depends on the price of the EUAs, which in turn is a function of the total emission budgets in all EU MS.

51 For example, the SRU (2006) argues that competitiveness arguments have been erroneously used in the political debate, when in fact the issue at stake is distribution.

52 For a recent overview, see Oberndorfer et al. (2006).

53 Unless a fixed budget exists for a benchmark-group of installations.

- The Netherlands Allocation in the German power sector in phase 2 should be based on benchmarks, as in the UK and the Netherlands,
- Differentiated benchmarks distort incentives for innovation. However, because of sunk costs, applying differentiated benchmarks to existing installations would be less harmful than for new installations. Differentiated benchmarks limit distributional effects and should gather higher political support than uniform benchmarks.

Allocation to new projects

- Allocation rules for new installations and modernizations are crucial from a long-term perspective since they (together with several other factors) determine investment decisions and thus affect the technology structure and CO_2-intensity of the capital stock many years in advance.
- Allocating allowances to new projects for free — as planned in the Draft NAPs for Germany, the UK and the Netherlands — amounts to subsidizing investments and output, and increases the costs of achieving climate targets. Thus, new projects should buy needed allowances at market prices.
- Since allocation to new entrants is perceived by the national governments as a means to attract new investments, the optimal allocation rule for new entrants is unlikely to emerge without coordination among EU MS.
- The German and Dutch Draft NAPs plan for reserve replenishment mechanisms if new projects receive free allowances from a new entrants' reserve. If future reduction costs are lower than current costs, such a mechanism will actually reduce total emissions over time. However, the opposite may also be true. The main critique, though, is that these mechanisms shift the burden of reducing emissions into the future, which is at odds with the concept of intergenerational equity.
- As a second-best solution, allocation for new entrants should be based on uniform BAT-benchmarks. Differentiating benchmarks (e.g., by fuels) distorts dynamic innovation incentives and also leads to higher societal reduction costs in the long run. Differentiated benchmarks are, in essence, technology- or fuel-specific subsidies and counter the spirit of emissions trading systems. In the EU ETS, flexibility and EUA market prices should guide investment decisions, rather than subsidies for particular types of installations.
- Rather than having two benchmarks for new energy technologies — one for gas and one for other installations — the final German NAP should rely on one benchmark only. For distributional reasons (and to save the new entrants' reserve and future budgets), this benchmark should be based on BAT for gas-fired combined-cycle gas turbines, as is the case in the UK.

- Like the use of weak benchmarks, the use of high standardized operating hours/load factors to calculate the number of free allowances for new projects corresponds to high subsidies, and possibly high windfall profits for new projects. Standardized load factors should be low to prevent depletion of the NER. The reserve would also benefit from low load factors because they make the (optional) use of the transfer rule more attractive.
- The standardized load factors proposed in the German Draft NAP, which tend to be in the range of actual historic load factors, should be adjusted downward. For power plants, which are expected to be responsible for the bulk of allowances for new projects from the NER, it is crucial that the standardized annual operating hours be kept at a much lower level than 7000 hours p.a.[54]
- To avoid unjustified, technology-specific subsidies, standardized load factors should be equal for all fuels or technologies (within a homogenous group of products), as is the case in the UK.
- Allocation rules for new projects in Germany, but not in the UK or the Netherlands, apply for several phases (now 14 years). This increases investment security, but is also likely to secure windfall profits for an equally long period of time. Allocation rules that extend well into the future also limit the flexibility of future NAPs and corresponding budgets.
- Transfer rules may speed up the establishment of new installations, since they should generate additional financial incentives for an earlier replacement of old installations. In the Draft NAP for phase 2, the Netherlands decided to introduce such a transfer rule, similar to the one already in place in Germany in phase 1. The transfer rule of phase 1 in the UK NAP is also proposed to be kept for phase 2. However, it is more restricted than the German transfer rule, since the closing and receiving installation need to have the same permit holder and need to fall in the same EU ETS sector.

Treatment of clean technologies

- To support investments in new CHP installations, Germany, the UK and the Netherlands use allocation rules to subsidize new CHP. In the UK, there is a special proportion of the New Entrant Reserve (10%) ring-fenced for good quality (GQ) CHP in order to ensure that the projected growth in CHP is accurately

54 Unlike other installations, there is no proposal for standardized operating hours for power plants included in the German Draft NAP.

and transparently recognised.[55] In addition, it is proposed that GQ CHP will receive 100% allocation based on the calculations for new entrants, compared to other electricity supply industries, which will receive a maximum of 90% of the calculated allocation. In Germany and in the Netherlands, new CHP plants benefit from an allocation based on a "double benchmark" for heat and electricity. From an economic perspective these special treatments correspond to an investment subsidy for particular CHP plants, but should not affect competitiveness of these plants per se. Instead, if additional support for CHP is considered necessary under current economic conditions, other types of support mechanisms, like feed-in tariffs or quotas, should be used.

- Because of transaction costs and to avoid double regulation, renewable energy technologies should be excluded from EU ETS. Renewable energy technologies benefit indirectly, since the EU ETS increases the generation costs for fossil-fuelled technologies.

Concluding remarks

- The analyses and arguments developed in this report suggest that — although some "improvement" in the NAPs is noticeable — there are still many allocation rules in the Draft NAPs for Germany, the Netherlands and the UK which reflect attempts made to use the EU ETS for distributional effects and to preserve existing energy structures. These rules often result in negative effects, such as increased costs of climate protection, shifting the burden of emissions reduction to operators of installations not benefiting from special provisions, or a transfer of wealth and windfall profits.[56]
- With respect to the aims of this project, the analyses carried out and the arguments presented show that there is still ample room to increase the ambition level of the Draft NAPs of Germany, the Netherlands, and to a lesser extent, the UK. This holds true for both the macro level, i.e., the overall budget, as well as for the micro level, that is, the design of the rules governing the allocation of allowances.

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55 Good quality CHP means that the power efficiency is greater than or equal to 20% and the Quality Index (which combines power and heat efficiencies adjusted by factors that take size, technology and fuel of the individual scheme into account) is greater than or equal to 100.

56 See also the assessment of allocation rules for the first trading period by the Council of Environmental Advisors to the German Government (SRU 2006).

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Annex A: Summary of National Allocation Plans for Germany, the United Kingdom and the Netherlands

GERMANY NAP 2005-2007	
Micro-level plan (allocation rules)	
Installations covered (share of CO_2 emissions)	1849 (59%), no opt-in, no opt-out, (no pooling). Allocation share of energy sector in terms of installations (emissions): 66.7% (78.8%).
Allocation method for existing installations	100 % cost-free allocation, with the following options: Based on annual average emissions in base period 2000-2002; uniform compliance factor of 0.9702 and uniform adjustment factor of 0.9538, use of new entrant rule and uniform adjustment factor (option rule). Note: Allocation method does not discriminate between sectors.
Allocation method for new entrants	100% cost-free allocation based on best-available technology benchmarks and projected output;[57] for electricity and heat generation, upper and lower bounds exist (e.g., 365g CO_2/kwh and 750g CO_2/kwh for electricity); investors may apply for higher specific values than the given lower bound if they can prove that the new technology is BAT; fixed product- or technology-specific benchmarks for the production of homogenous products (cement clinker, glass and bricks); BAT standards for inhomogeneous products on the basis of a submission-of-proof procedure; no compliance factor will be applied to these allocation rules for 14 years. *Transfer rule*: Allowances from closed installations may be transferred to replacement installation for four years (afterwards no compliance factor will be imposed for 14 years).
Special provisions for energy –efficient-installations	For existing *combined heat and power* (CHP) installations, additional allowances of 27 t per kWh CHP electricity generation.[58] Double benchmark (heat/electricity) for new CHP plants.
Treatment of renewable energy sources (RES)	Installations covered by Renewable Energy Act (benefit from feed in tariffs for RES) are excluded from EU ETS.

57 Subject to ex-post adjustment; decision by European Court of Justice is pending.

58 Subject to ex-post adjustment; decision by European Court of Justice is pending.

Special features	*Early action rules*: Installations which exceed threshold levels for specific emission reductions receive allocation with compliance factor of 1.0 for 12 years after modernization (going back to 1994); if specific reduction exceeds 40%, compliance factor will be 1.0 for the first two trading periods. For *process-related emissions*, compliance factor of 1.0 is applied if share of process-related emissions on total emissions exceeds 10% (adjustment factor is not applied). *Capacity utilisation adjustment rule*: If in one year a drop in production leads to emission levels which are below 60% of emission levels in the base period, allocation will be adjusted in proportion (ex-post adjustment). Hardship clause(s): Special provisions may apply, if emissions in base period are at least 25% below "regular" levels. Additional allowances as compensation for *phase-out of nuclear power*. *Reserve replenishment rule*: Size of reserve is 3 Mt p.a. (i.e., 0.6% of budget); if needed, additional allowances will be purchased by the German Reconstruction Bank (KfW) and distributed free of charge; the purchased quantity of allowances will be subtracted from the budget in 2008-2012 and sold on the market (refinancing of KfW). Allocation rules, in particular new entrant rules, are in part defined over long periods; complex system, 58 combinations of rules were used.

Note: New data from revised NIR for Germany (2006) resulted in adjustment of base year emissions and target emission levels; application of ex-post adjustments are subject to final outcome of lawsuit at EU Court of Justice on EU Commission decisions regarding German NAP.

GERMANY

NAP 2008-2012 (Draft Version of 13 April 2006)

Macro-level plan (emission targets and budgets)

Burden sharing target (BS) & ETS	$GHG_{1990/1995}$ (Mt CO_2e/a)	$CO_{2,1990}$(Mt CO_2e/a)		BS target (Mt CO_2e/a)	BS (%)	(Hypothetical) CO_2 BS target excluding Kyoto mechanisms (Mt CO_2e/a)	
		ETS[59]	Non-ETS			ETS[60]	Non-ETS
	1230.3	**378.1**	**651.1**	**972.9**[61]	**-21**	**453.5**	**394.6**
		1029.1				**848.1**	
Emissions, distance to target (DTT), use of Kyoto mechanisms (KM) by government	GHG_{2004} [62] (Mt CO_2e/a)	$CO_{2,2004}$(Mt CO_2e/a)		KM $_{2008-12}$ (Mt CO_2e/a)		DTT_{2004} Mt CO_2e/a	
		ETS	Non-ETS			without KM	with KM
	1008	**540**	**341.1**	**0**		**43.3**	**43.3**
		882.0[63]					

ETS cap (both NAP I and II) & new entrant reserve (R)	**2005-07**			**2008-12**		
	$ETS_{2005-07}$ cap including $R_{2005-07}$ (Mt CO_2e/a)	$R_{2005-07}$		$ETS_{2008-12}$ cap including $R_{2008-12}$ (Mt CO_2e/a)	$R_{2008-12}$	
		Mt CO_2e/a	%		Mt CO_2e/a	%
	499	**3**	**0.6**	**495.5**	**12 (10)**[64]	**2.4 (2)**

Verified emissions (VET) of ETS-installations	VET_{2005} Mt CO_2 (% of installations covered)	Difference to allocation for 2005		Emissions of additional installations (Mt CO_2)
		Mt CO_2	%	

59 In Germany: Sectors Energy and Industry from Energy Balances, therefore numbers in NAP II vary from our calculations: Hypothetical CO_2 BS target 849, distribution between ETS and non-ETS is 515 and 334.

60 In Germany: Sectors Energy and Industry from Energy Balances.

61 The emission levels and targets changed compared to the data underlying NAP I because of adjustments in the national inventory NIR (see German Draft NAP 2008-12): NAP states 967 Mt CO_2e/a for Kyoto period.

62 Draft NAP Germany (Data for 2004).

63 UNFCCC 2006 data submitted by Germany states CO_2 emissions for 2004 with 885.9 Mt CO_2e/a.

64 10 Mio t for new entrants, 2 Mio t to be sold to cover administrative costs of JI/CDM and KfW-mechanism

(2005)	**473.7** (99.8%)		**21.3 (22.3)**		**4.3 (4.5)**	**11**
Base period (BP), projection (P), growth rates (GR)	BP (years)	BP (Mt CO_2e/a)	$P_{2008-12}$ (Mt CO_2e/a)	Δ_{BP-P} (Mt CO_2e/a)	$GDP_{2003-10}$ (%)	$GR_{2008-12}$ NAP II (%)
	2000-2005	**509**[65]	**NA**	**NA**	**1.5**[66]	**-**
Rationale for cap	Not result of optimization approach; relies on cap and logic developed for NAP 2005-2007, where cap for energy and industry sectors (from German energy balances) was outcome of political negotiations.					
Information on future ETS caps	**Yes:** Cites European Council's target of at least minus 15-30% until 2020 for industrialized countries, further states Environment Council's recommendations of minus 60-80% until 2050 for industrialized countries; German government aiming at EU Post-Kyoto target of -30% by 2020 (compared to 1990), if the EU commits to such a target, Germany will even further reduce its emissions. For this case, The Climate Protection Programme 2005 sets a medium-term target of -40 %. As for all other sectors, the ETS budget for 2013-2017 will reflect these future reduction targets, too.					

Micro-level plan (allocation rules)

Installations covered (excluding opt-out and including opt-in)	# 2005-07	# 2008-12	Inclusion of additional installations			Opt-in / opt-out (Yes/No)		
						2005-07	2008-12	
	1849	**tbd**	**Yes: Crackers in chemical industry, etc. according to NAP II guidance (2005)**			**No / No**	**No / No**	
Allocation method for existing installations	Cost-free Allocation							Auctioning
	%	Compliance Factor				Growth Factor		
	100	Energy	Industry	CHP	Others	Energy	Industry	**No** (but share of reserve is being sold)
		0.85	**0.9875**	**1**	**-**	**None**	**None**	
	Based on annual average emissions in extended new base period of 2000-2005 (in NAP I: 2000-2002).							KfW-mechanism and JI/CDM fees

65 Average for 2000-2002, including 11 Mio t for additional installations.

66 IEA/OECD (2005): Energy policies of IEA countries, 2005 Review.

Allocation method for new entrants	100% cost-free allocation based on BAT-benchmarks and standardized utilisation rates[67] for electricity and heat generation; only two benchmarks are applied, one for gas-fired installations (365g CO_2/kwh for electricity) and one for others (750g CO_2/kwh for electricity); no compliance factor will be applied to these allocation rules for 14 years. Standardized load factors fixed product- or technology-specific benchmarks for the production of homogenous products: cement clinker (three different technologies), glass (two types of products), and bricks (four types of products); BAT standards for inhomogeneous products on the basis of a submission-of-proof procedure; no compliance factor will be applied to these allocation rules for 14 years. *Transfer rule*: Allowances from closed installations may be transferred to replacement installation for four years (afterwards no compliance factor will be imposed for 10 years). Note: Somewhat shorter and not identical binding allocation rules.
Reserve	12 Mt CO_2/a, of which 2 MtCO_2 are being sold on the market to finance KfW-mechanism and to cover administration costs for JI/CDM. If reserve is depleted, it will be replenished through the market (see special features below).
Closure rules	No further allocation of allowances after closure exception: Transfer rule for replacement installations) operator has to declare closure; intention to include suitable measures in final NAP II.
Special provisions for energy-efficient installations	*Combined heat and power* (CHP) face less stringent compliance factor of 0.9875.
Treatment of renewable energy sources	Installations covered by Renewable Energy Act (benefit from feed-in tariffs for RES) are excluded from ETS.
Use of ERUs/CERs by companies	Max. 12% of allocation to each installation can be used at once or spread over trading period.
Special features	No specific *new early action rule.* No special treatment of existing *combined heat and power* (CHP) installations or *process-related emissions*; both are considered to be recognized via a compliance factor of 0.9875. Special treatment of *small installations*: Installation with average annual emissions of less than 25,000 t CO_2 in the base period receive compliance factor of 1.0. *No capacity utilisation adjustment rule*; no *ex-post* adjustments. No special *hardship clause* (s) foreseen. No additional allowances as compensation for further *phase-out of nuclear power.* *Reserve replenishment rule* (as before): if needed additional allowances will be pur-

67 Because ex-post adjustment is ruled out in NAP guidance, standardized utilization rates were used rather than projected output as in the NAP for 2005-2007.

	chased by the German reconstruction Bank (KfW) and distributed free of charge; the purchased quantity of allowances will be subtracted from the budget in the subsequent trading period and sold on the market (refinancing of KfW); in addition 2 Mt will be sold to cover administrative costs for CDM and JI projects and to finance the reserve replenishment rule of NAP 2005-2007. *Malus rule*: Old inefficient coal and lignite power plants receive cuts of 15%. *Closure rule*: not yet specified.
Information on future allocation rules	No statement in Draft NAP of April 13, but in earlier versions benchmarking was mentioned as future allocation rule for existing installations.
Comparison with first NAP	No choice between allocation based on new entrant rule (options rule) and grandfathering; special provisions for CHP are easier; no ex-post adjustments, nor special rules for process-related emissions, early action, phase out of nuclear, or hardship planned; only two benchmarks for new energy installations; system is less complex and more transparent, discrimination of compliance factor between energy installations and other installations; special compliance factor for small installations.

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UNITED KINGDOM NAP 2005-2007	
Micro-level plan (allocation rules)	
Installations covered (share of CO_2 emissions)	674 (46%), no opt-in, opt-out up to 2007 for installations covered by UK emissions trading scheme (63 installations) and opt-out up to 2008 for 330 installations covered by the climate change agreements.[68]
Allocation method for existing installations	100 % cost-free allocation. all sectors/subsectors (except for the energy sector) receive an allocation at the level of projected emissions (allocation according to estimated need). The energy sector receives the remaining allowances once other sectors allocations have been taken off the total cap. 2-level allocation method **Sector budget:** Around 50 different sectors. Projected sector-specific emissions in 2005-2007 were determined on the basis of historic emissions multiplied by growth rates. Allocation needed for new entrants have been subtracted. **Allocation at installation level**: Ratio of the installation's historic emissions to the sum of the sector's historic emissions multiplied by the sector budget. Base period: 1998-2003, excluding the year with the lowest emissions; if the installation commenced operation in the base period, the reference period is correspondingly shorter.
Allocation method for new entrants	New installations are installations, capacity extensions or closed installations that re-commence operation, which commence operation on/after 1 January 2004. Allocation to be made cost-free from new entrants' reserve, whilst there are still allowances remaining in the reserve. Capacity utilization in 2005-2007 is derived from uniform and subsector average figures determined ex ante.
Reserve	Allocation to be made on the basis of BAT benchmarks. Reserve for new entrants: 15.6 Mt CO_2 p.a. (equivalent to 6% of the ETS budget). Will be distributed on a first-come-first-served basis and any allowances remaining at the end of the phase may be auctioned. Additional special allocation: CHP and late applicants. Transfers are possible in cases in which capacity utilization or production is transferred between one operator's installations (in the same sector) during the phase. Precondition: The installations must produce comparable products (same 3-digit SIC code), the permit holder must be the same for both installations, the transferring installation must cease operations and at least 50% of the transferring installation's production must be transferred. This rule does not apply to the power stations sector.

68 EU Commission 2006: Commission decision of 23/XII/2005 concerning the temporary exclusion of certain installations bet he United Kingdom, C(2005)5714final.

Treatment of Renewable Energy Sources (RES)	No special treatment.
Special Features	Good quality CHP special ring-fenced new entrant reserve to ensure allocation for new entrants. No early action other than through the base period.

UNITED KINGDOM

NAP 2008-2012
(Draft Version March 2006)

Macro-level plan (emission targets and budgets)

Burden sharing target (BS) & ETS	$GHG_{1990/1995}$ (Mt CO_2e/a)	$CO_{2,1990}$(Mt CO_2e/a)		BS target (Mt CO_2e/a)	BS (%)	(Hypothetical) CO_2 BS target without Kyoto mechanisms (Mt CO_2e/a)	
		ETS	Non-ETS			ETS	Non-ETS
	764.5	**NA**	**NA**	**668.9**	**-12.5**	**245.9**	**324.5**
		590.2				**570.4**	
Emissions, distance-to-target (DTT), use of Kyoto mechanisms (KM) by government	GHG_{2004} (Mt CO_2e/a)	$CO_{2,2004}$(Mt CO_2e/a)		$KM_{2008-12}$ (Mt CO_2e/a)		DTT_{2004} Mt CO_2e/a	
		ETS	Non-ETS			without KM	with KM
	659.3	**242.4**	**319.8**	**0**		**9.6**	**9.6**
		562.2					

ETS cap (both NAP I and II) & new entrant reserve (R)	**2005-07**			**2008-12**		
	$ETS_{2005-07}$ cap including $R_{2005-07}$ (Mt CO_2e/a)	$R_{2005-07}$		$ETS_{2008-12}$ cap including $R_{2008-12}$ (Mt CO_2e/a)	$R_{2008-12}$	
		Mt CO_2e/a	%		Mt CO_2e/a	%
	245.3	**18.9**	**7.7**	**252**[69]	**17**	**6.7**

Verified emissions (VET) of ETS-installations (2005)	VET_{2005} Mt CO_2 (% of installations covered)	Difference to allocation for 2005		Emissions of additional installations (Mt CO_2)
		Mt CO_2	%	
	242.4 (99.9%)	**-33.1 (wrt 209.4)**	**-15.8%**	**max. 7.8** (DEFRA 2006b)

69 Only for the installations covered in phase 1 (but includes the opted-out installations since they have been covered from January 2007 onwards). For additional installations, cap still needs to be determined. The maximum cap will be around 261 Mt CO2 (6.5% of maximum cap=> 85 MtCO2 for reserve for a five year period).

Base period (BP), projection (P), growth rates (GR)	BP (years)	BP (Mt CO_2e/a)	$P_{2008-12}$ (Mt CO_2e/a)	Δ_{BP-P} (MtCO_2e/a)	Δ $GDP_{2003-10}$ (%)	$GR_{2008-12}$ NAP II (%)
	2000-2003[70]	**242.4**[71]	**270.5**	**-28.1**	**3**[72]	**Varying**
Rationale for cap	The cap was set in line with new UK Climate Change Programme 2006, which is among others based on the following principles: - the need to take a balanced approach with all sectors and all parts of the UK playing their part; - the need to safeguard, and where possible enhance, the UK's competitiveness, encourage technological innovation, promote social inclusion and reduce harm to health.					
Information on future ETS caps	**No: *But targets for 2050 (-60% CO_2 reduction) with real progress by 2020.***					
Comments	ETS CO_2 share: 50% all 6 GHG (projected for 2008-2012).					

Micro-level plan (allocation rules)

Installations covered (excluding opt-out and including opt-in)	# 2005-07	# 2008-12	Inclusion of additional installations	Opt-in / Opt-out (Yes/No)	
				2005-07	2008-12
	1057	tbd	Glass; mineral wool; gypsum; flaring from offshore oil and gas production; petrochemicals (crackers); carbon black; integrated steelworks etc. (DEFRA 2006b)	Opt-in: No Opt-out: Yes; 59 install. in UK ETS, 329 install. under climate change agreements.	No

Allocation method for existing installations	Cost-free Allocation							Auctioning
	%	Compliance Factor				Growth Factor		
	90-98	Energy	Industry	CHP	Others	Energy	Industry	2-10% (subtracted from energy-cap)
		Bears reduction	1	1	1	Yes	Yes, varying for 17 sectors	

70 Average of highest three years. In NAP I the base period was 1998-1999. However this early data is considered to be of poorest quality and incomplete, which is why none of the year was included. Data from 2004 was not included since there would have been considerable costs involved in collecting the data or might have lead to perverse incentives.

71 No data yet for the base period, therefore, as a proxy we use VET 2005 data for NAP I installations only.

72 Source: IEA/OECD (2005): Energy policies of IEA countries, 2005 Review.

	2-level allocation method: **Sector budget:** - 17 different sectoral budgets (projected emissions) are set based on sectoral growth factors and reduction potential. A proportion is deducted for the new entrant reserve. - Total reduction (incl. auctioning) will be borne by electricity supply industry (ESI). All other sectors will receive allocation based on projected BAU emissions. **Allocation at installation level:** - Allocation for electricity supply industry will be based on a benchmark (and possibly for the brewing sector, as well): Individual plant's Transmission Entry Capacity (as given in national Grid's Seven Year Statement 2005 sub-sector) X standard load factor X sub-sector standard emission factor (efficiency factor X fuel emissions factor). Five different technologies are distinguished.[73] - All other sectors are allocated based on a share of relevant emissions of an installation in the base period (2000-2003) multiplied by total available allowances of the sector (see step 1). Good quality CHP (GQ CHP) will be based on 2001-2003 emissions.
Allocation method for new entrants	New entrants are installations that open during 2008-2012 or that start operating in later phase 1 (after 30 June 2006). Allocation will be based on BAT benchmarks, some of which have been revised from those under phase 1. The majority of new entrant benchmarks assume use of gas and electricity supply industry benchmark is CCGT. It is proposed that non-ESI and non-GQ CHP new entrants will receive 95% of the allowances allocated based on spreadsheets. ESI new entrants will receive 90% or same cut in allocation as ESI incumbents, whichever is greater. GQ CHP will receive 100% of allocation based on calculation by the spreadsheet.
Reserve	The New Entrant Reserve is made up of contributions from each of the 17 sectors. An indicative figure given in NAP II is 85 Mt CO2e, which is 6.7% of allocation. However, the final size is not decided yet. 11 MtCO2e may be used for late phase 1 new entrants (start after 30th of June 2006).
Treatment of closures	An installation is considered to have ceased production when: 1) The installation ceased operating 2) Capacity of installation dropped below thresholds of Annex I in Directive. Permanently closed installations will retain allowances for the year in which the closure occurs but will not be issued allowances for the years after closure. Same transfer rule (called rationalization rule) as in phase 1 is proposed. This rule states that if one installation has closed and operations are moved to another installation or installations, the operator may apply to continue to receive a percentage of the allowances from the closed installation.
Treatment of renewable energy sources	Combustion of biomass and waste material are mentioned as reduction options and their use should be enhanced due to benchmarking based on gas.

73 Gas-fired generators; coal-fired generators that have opted in to the Large Combustion Plants Directive by 3 February 2006; coal-fired generators that opted out of the Large Combustion Plants Directive by 30 June 2004 and have not opted back in by 3 February 2006; nonGoodQuality CHP (GQ CHP) capacity at CHP plants and others.

Use of ERUs/CERs by companies	Not quantified yet but the proposal is to base it on the level of effort (allocation compared to BAU). The limit will most likely be set annually with banking between years. It has not yet been decided if the limit will be based on national, installation or sector level.
Special features	*Good Quality Combined Heat and Power* (GQ CHP): To give a strong incentive to invest in this kind of clean technology. Growth rates and a ring-fenced reserve are set in order to ensure favorable treatment of GQ CHP. In addition, GH CHP will receive 100% of the amount of allowances calculated by the spreadsheets. The allocation will be based on 2001-2003 emission data after dropping the lower year of emissions. *Contingency reserve* of most likely less than 1% in order to provide flexibility (e.g., if administrative error in allocation, late issuance of permit). Rest will be transferred in new entrant reserve.
Information on future allocation rules	No statement in Draft NAP of March 2006.
Comparison with first NAP	Approach relatively similar to NAP I but now includes benchmarking element for electricity supply sector and auctioning.

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DEFRA 2006b: EU Emissions Trading Scheme phase II (2008-2012) Expansion – Explanatory Note

NETHERLANDS NAP 2005-2007	
Micro-level plan (allocation rules)	
Installations covered (share of CO_2 emissions)	There were 152 opt-outs (9 ”combustion sites” and sites <25kt; an additional149 small emitters still await opt-out approval from EC).
Allocation method for existing installations	100 % cost-free allocation - Historic emissions X growth factor (per sub sector) X efficiency factor (benchmark) X compliance factor (0.97). - Compliance factor of 0.97 is without reserve because allocation formula contains a growth figure. - Base period is 2000-2001 unless company can prove that these years were not representative.
Allocation method for new entrants	Cost free allocation according to BAT benchmark as applied worldwide - Known new entrants receive allocation from sector budgets, are included in NAP I. - Unknown new entrants receive allocation from reserve (4 Mt).
Special provisions for energy-efficient installations	- Via benchmark: EE factor is maximum 1.1. - Double benchmark for existing CHP installations.
Treatment of renewable energy sources (RES)	Due to Coals Covenant, amount of CO_2 avoided is subtracted from allocation via co-fired biomass.
Special features	- Compliance factor is applied to *process related emissions.* - *De minimis rule* regarding sites with <25kt (opt out). - Allowances for energetically usable blast furnace gas (Hoogovengas) are allocated to final user. - Closure rule: Not clear; commitment to address this in next NAP and legislation. - EC Decision July 7 accepts NAP, provided cut of 3 Mt, to 95.3 Mt.

NETHERLANDS

NAP 2008-2012
(Draft Version of May 23rd 2006; comments deadline on July 4th[74])

Macro-level plan (emission targets and budgets)

Burden sharing target (BS) & ETS	$GHG_{1990/1995}$ (Mt CO_2e/a)	$CO_{2,1990}$(Mt CO_2/a)		BS target (Mt CO_2e/a)	BS (%)	(Hypothetical) CO_2 BS target without Kyoto mechanisms (Mt CO_2e/a)	
		ETS	Non-ETS			ETS	Non-ETS
	212.9	**NA**	**NA**	**200.2**	**-6**	**73.9** [75]	**92.2**[76]
		159.4[77]				**166.1**	

Emissions, distance-to-target (DTT), use of Kyoto mechanisms (KM) by government	GHG_{2004} (Mt CO_2e/a)	$CO_{2,2004}$(Mt CO_2e/a)		KM $_{2008-12}$ (Mt CO_2e/a)	DTT_{2004} Mt CO_2e/a	
		ETS	Non-ETS		without KM	with KM
	217.8	**80.4**	**100.3**	**20 (JI: 34; CDM: 67)**	**-17.6**	**2.6**
		180.7				

ETS cap (both NAP I and II) & new entrant reserve (R)	**2005-07**			**2008-12**		
	$ETS_{2005-07}$ cap including $R_{2005-07}$ (Mt CO_2e/a)	$R_{2005-07}$		$ETS_{2008-12}$ cap including $R_{2008-12}$ (Mt CO_2e/a)	$R_{2008-12}$	
		Mt CO_2e/a	%		Mt CO_2e/a	%
	95.9[78]	**2.5**	**2.6**	**99.2**[79]	**6**[80]	**6**

Verified emissions (VET) of ETS-installations (2005)	VET_{2005} Mt CO_2 (% of installations covered)	Difference to allocation for 2005		Emissions of additional installations (Mt CO_2)
		Mt CO_2	%	
	80.351[81] (100%)	**6.1 (using 86.5)**	**7**	**12-14**

74 See NAP II.

75 Draft NAP II, page 27, table 2-1: 108.8 Mt CO_2/a.

76 Draft NAP II, page 23, table 1-2: 119.2 Mt CO_2/a.

77 See UNFCCC 2006.

78 NAP II: Cap including ETS/Non-ETS was 112 Mt. In fact, due to opt-outs only 86.5 Mt was allocated.

79 That is including additional sits, opt-outs.

80 There is an additional 'legal claims' depot of 0.5 Mt/a.

81 See VET NL 2005.

Base period (BP), projection (P), growth rates (GR)	BP (years)	BP (Mt CO_2e/a)	$P_{2008-12}$ (Mt CO_2e/a)	Δ_{PP-P} (Mt CO2e/a)	Δ $BIP_{2003-10}$ (%)	$GR_{2008-12}$ NAP II (%)
	Average of 3 out of: 2000-2005	**92.8**[82]	**99.1**[83]	**-6.3**	**2.9**[84]	**1.7**[85]
Rationale for cap	Benchmarking covenant is main driver for cap (15% EE in 2010), assuming that emission trends are de-linked from economic growth. There is a small shift to non-ETS. A large use of KM is needed to meet Kyoto.					
Information on future ETS caps	No: Only 2°C target.					
Comments	Government is preparing extra measures to meet Kyoto: 6 Mt in non-ETS sector (energy saving in building; increase use of biofuels for cars to 5.57%; fiscal clean car purchase incentive) and 1. 4 Mt in ETS sectors.[86]					

Micro-level plan (allocation rules)

Installations covered	# 2005-07	# 2008-12	Inclusion of additional instal-lations	Opt-in/opt-out (Yes/No)	
				2005-07	2008-12

82 ETS participants average inventory report for 2001 and 2002 (92.6 resp. 93Mt, excluding process emissions: 78.6 resp. 79.3), from ECN 2006a.

83 Own calculation, based on share of ETS-CO_2 emissions (VET 2005) relative to national GHG emissions (2004) and projection of national GHG emissions of 224 Mt CO_2e for 2010 (95% certainty [MNP]); that is 2 Mt above target, with policy. Without policy it would be 246 Mt in 2010.

84 Source: IEA/OECD (2005): Energy policies of IEA countries, 2005 Review.

85 1.7% CO_2 growth, for all sectors on average, ECN 2006b.

86 MNP 2006.

(excluding opt-out, including opt-in)	**210**	**500**[87]	- Crackers etc (14) - 2 Carbon Black (0.3) - Off-gas process emission from desulphur. installations from coal-fired power - 2 plus 1 new entry acid producers, 50% of N_2O (1.6) - 80-100 horticulture greenhouses with >20MW_{th} (2Mt) - Hospitals, universities with CHP (0.25)[88]	**Opt-out:** Yes: 152 (9 combust. and <25kt sites, 149 small emitters still await opt-out approval) **Opt-in:** No: (Though some denied opt-out provision)	- **Opt-in**: Sites with linked 20 MWth (instead of single installations) may opt-in - **Opt-in**: N_2O for saltpetre production for 50% of its CO_2e (Art 24 Directive): 1.6 Mt/a allocation

Allocation method for existing installations	Cost-free allocation							Auctioning
	%	Compliance factor				Growth factor		
	96	Energy	Industry	CHP	Others	Energy	Industry	4%
		0.86[89]	**0.86**[90]	**0.86**	**1** small installation	**1.7**	**1.7**	(or sold [3.9 Mt]); this is 10% of the power sector cap and 2/3 of the 15% windfall allowance correction of the power sector

87 That amounts to 90% of energy/industry emissions. NL small companies provision: NAP 2 will include sites with single 20MW_{th}; in NAP 1 it could also be linked 10MW_{th}. When companies want to participate they can use an opt-in provision. It will be up to the EC to accept the narrower 20MWth approach and the opt-in. This will mean that 100 horticulture sites that are thought to participate in ETS (Agreement May 12) are not included.

88 ECN 2006 a.

89 NAP II proposes that the calculated allocation will be shortened with 15% over the net electricity delivered to the grid minus purchased electricity. This threshold is the first 350 GWh, so most CHP installations are excluded of 15% cut. But it appears that a handful of the largest (joint venture) CHP plants will be included. The destination and compensation will be as follows: 2/3 of the 15% will benefit small users/households (later to be decided how) through the sale of est. 4% of the overall allocation; 1/3 of the 15% (2%) will be allocated to 'the other ETS participants,' based on electricity used (data for that are asked).

90 50% of the process emissions will be excluded.

	- Allocation=HE X GF X EE X C X sb: Historic emissions (average of 3 out of 2001-2005) * growth (2005-2010) * relative energy efficiency * correction factor * sector specific special circumstances. - Requirements: Environment permit or notification; concrete building plans; official Board investment approval within 6 months after EUA request. - Growth: For 2005-2010 is CO_2 related growth, based on May 2006 ECN projections.[91] ECN has taken into account closures and new entrants in a sector to come with average growth of 1.76%. - *Benchmark* is determined by: - 1) EE=distance to world top by Benchmarking Covenant; assessment is confidentially done by VBE.[92] Energy efficiency is maximised at 15%, so EE can be max 1.15. - 2) Energy Efficiency Agreement,[93] EE=1; companies that do not participate in 1) or 2) get EE=0.85: 15% energy efficiency is assumed in 2008-20012 regarding 2001-2005. - 3) For CHP, default EEs are used (gas/oil: 52% [E], 90% [heat]; coal 39%/90%; Hoogoven gas 40%/90%. - 4) For process emissions EE=1 (plus correction factor is applied for 50%). Specific sector circumstances can be: 50% correction application for process emissions and power companies that implement the Coal Covenant (co-firing biomass) means that the allocation will be reduced with the co-firing part due to the existing Coal Covenant (to implement RE Directive).
Allocation method for new entrants	- Coverage: Sites active after Dec. 2006, not sites that received opt-out under NAP I (these will be treated as existing sites). Physical growth means new units within site. Threshold @ 50kt/a or 10% of capacity. - Allocation on basis of best practice and expected emissions, but max. 90% of official design (name plate) capacity. No correction factor; no growth factor. New power companies will not be affected by cap to address windfall profits. - *Transfer provision:* When the production of site A moves to site B within NL within the same company (as in Art. 24b Civil Code), the company can keep the EUAs, provided the production of site B increases with 10% growth or 50kt CO_2.
Reserve	- 30 Mt, 6 Mt/a on first-come-first-served basis. - NL will look for ways to replenish the depot when emptied. It will be filled with unused reserve for legal claims and unused allowances after closures. - Legal claims depot is 0.5 Mt/a.
Closure rules	Closure means not meeting criteria of Art 16.5, 1 Environment Act (no monitoring of emission etc.); NEA can withdraw CO_2 permit, then no more allowances will be issued. Unissued allowances will be added to new entrant depot.
Special provisions for energy-efficient installations	- Dealt with in general allocation method. - New entrants should apply BAT. - Saltpetre industry should apply below BAT.
Treatment of renewable energy sources	No provision. Power companies are treated on energy efficiency/capacity, not on CO_2/kWh. Newcomers on BAT.

91 ECN 2006b.

92 www.benchmarking-energie.nl

93 www.senternovem.nl/mja

Use of ERUs/CERs by companies	8% of quota; unclear whether this is for application per annum or if companies are free to use it, e.g., in one year at once. When other MS will apply other percentage, percentage will be reconsidered. NL not JI host country.
Special features	- 15% cut of power companies quota (not for new entrants; see above). - Allocation for N_2O installations will be based on benchmark in gg N_2O/ton of 100% saltpetre X U GWP X growth; benchmark cap will be lower than BAT cap; NL will add N_2O monitoring protocol. When benchmark is not ready, entry into force may be later than Jan. 2008. Allocation = P (average production 3 of 2001-2005 X 100% saltpetre) X Benchmark (1.7 kg/t 100% Salp.) X GWP (310) X Growth 1.7 (though NAP says no growth rate for N_2O allocation. The N_2O new entrant depot is 1.3 Mt, legal claims depot is 0.032: Total available: 7.75 Mt EUA/a.
Information on future allocation rules	Not in NAP. But Minister of Economic Affairs Brinkhorst wrote in a May 24 letter to European Commission (Green Paper EE) that he prefers for future allocation: - A continuation of the ETS after 2012; - Needed changes in the system: Harmonization of allocation for new and existing sites, limit free allocation to the power sector to tackle 'windfall profits' and to take into account the value of CO_2 storage and nuclear energy; - Extension of EU ETS to aviation, marine transport and non CO_2 gases.
Comparison with first NAP	Difficult to compare. Looks more stringent. More companies are included. Some additions take own CO_2 space (N_2O, CO_2 in horticulture; CO_2 from buildings). Reserve of 30Mt is mainly for new coal power plants (no sustainable signal). To limit the inclusion of $20MW_{th}$ to sites with at least a single $20MW_{th}$ might not be accepted by EC.

References

- NAP-2, the Netherlands, May 23rd: http://www.senternovem.nl/mmfiles/Ontwerp%20Allocatieplan%20NAP-II_tcm24-188483.pdf
- UNFCCC 2006: Netherlands' Report to the UNFCCC on Demonstrable Progress under Art. 3.2. Kyoto Protocol Feb'06
- VET NL: Verified Emissions Report, see: http://ec.europa.eu/environment/climat/emission/pdf/citl_netherlands.pdf
- ECN 2006a: Allocation for CAP, May 2006: www.ecn.nl/docs/library/report/2006/c06030.pdf
- ECN 2006b: ECN, Groeicijfers voor CAP, May 2006: http://www.ecn.nl/docs/library/report/2006/c06031.pdf
- MNP2006: Milieubalans 2006., May 2006
- NIR / CRF 2006 for the Netherlands, UNFCCC (all data not further specified is taken from UNFCCC 2006

Annex B: Analysis of verified emission data for 2005

On 15 May the European Commission released the 2005 CO_2 emissions data and compliance status of more than 9,400 installations covered by the EU ETS from 21 Member States.[94] The published data show a surplus of about 44 m EUAs (compared to total emissions by these installations of about 1,785.3 m EUAs for 2005). Thus, the surplus of allowances for these installations amounts to about 2.5 %. With the announcement of Luxembourg's surplus of 0.6 Mt CO_2e, the EU surplus comes to 44.6 m, 2.4% of its total allocated EUAs (CEC 2006b).

The situation for the countries covered in this report is as follows: With a surplus of about 21 m EUAs, Germany exhibits the largest surplus of all MS in terms of quantity. In relative terms, the surplus accounts for 4.3 % of the German ET-budget, which is also well above average. In relative terms, the surplus of 6.2 m EUAs in the Netherlands is even larger (6.6 % of ET-budget). By contrast, with a shortage of 36.4 m EUAs (or 15.8 % of the ET-budget) installations in the UK exhibit the largest shortage in absolute values.

B.1 Analysis for Germany

Figure B-1 indicates that on average, all activities in Germany enjoyed a surplus of allowances. The highest relative surplus is found in the production of cellulose (only four installations). The surplus of energy installations (combustion installations in the energy and industry sectors), which are responsible for the vast majority of emissions (about 80%) and of installations (about 2/3), amounts to 9.5 m EUAs, or 2.5% of total EUAs allocated to these installations. By comparison, installations in all activities in the industry sector (i.e., excluding energy installations) account for about 33% of installations and 20% of allocated EUAs. The surplus of these installations is approximately 11.1 m EUAs, which corresponds to 10.6 % of total allocation to these installations (DEHSt 2006). A more detailed analysis of the underlying sources for the surplus by the German Emissions Trading Authority (DEHSt) reveals that the installations that received their allocation based on the options rule are responsible for more than half the surplus in Germany (DEHSt 2006, p. 16).

Overall, for the first year of the EU ETS about 2/3 of all installations in Germany received more allowances than they surrendered, while about 1/3 of all installations were short.

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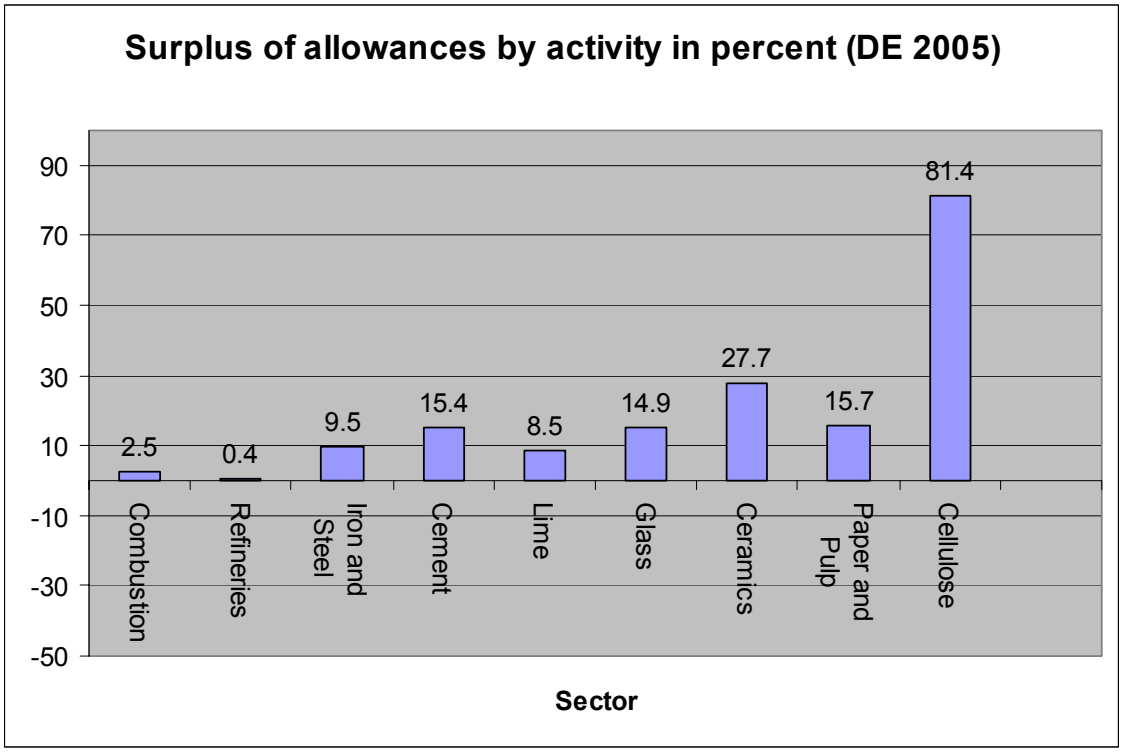
94 Since the registries of Cyprus, Luxembourg, Malta and Poland were not operational, installations from these MS are not included in this report.

Figure B-1: Surplus of allowances by activity in percent of allocated quantities of EUAs in Germany



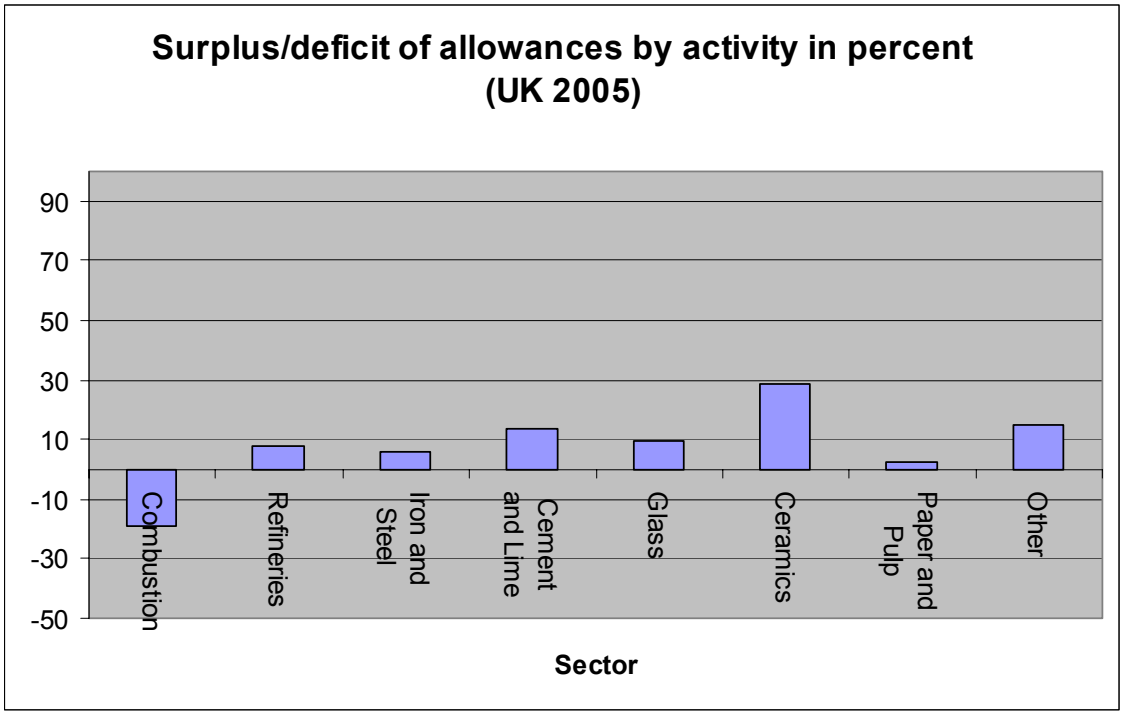
Source: Fraunhofer ISI based on DEHSt (2006)

B.2 Analysis for the UK

Figure B.2 reflects that the UK allocation for the first trading period is by design more stringent on the energy sector[95] than on the industry sectors. Energy installations face an average deficit of almost 20%, corresponding to a total of over 35 m EUAs, while the non-energy installations enjoy an average surplus of about 9%, corresponding to a total of around 47 M EUAs. Overall, for the first year of the EU ETS slightly more than half the installations in the UK received more allowances than they had emitted. A sectoral analysis shows that about half the energy installations face a deficit. In the iron and steel sector, this share is 90%, and in the other industry sectors (besides “Other”) it is around 70% (see Figure B-3).

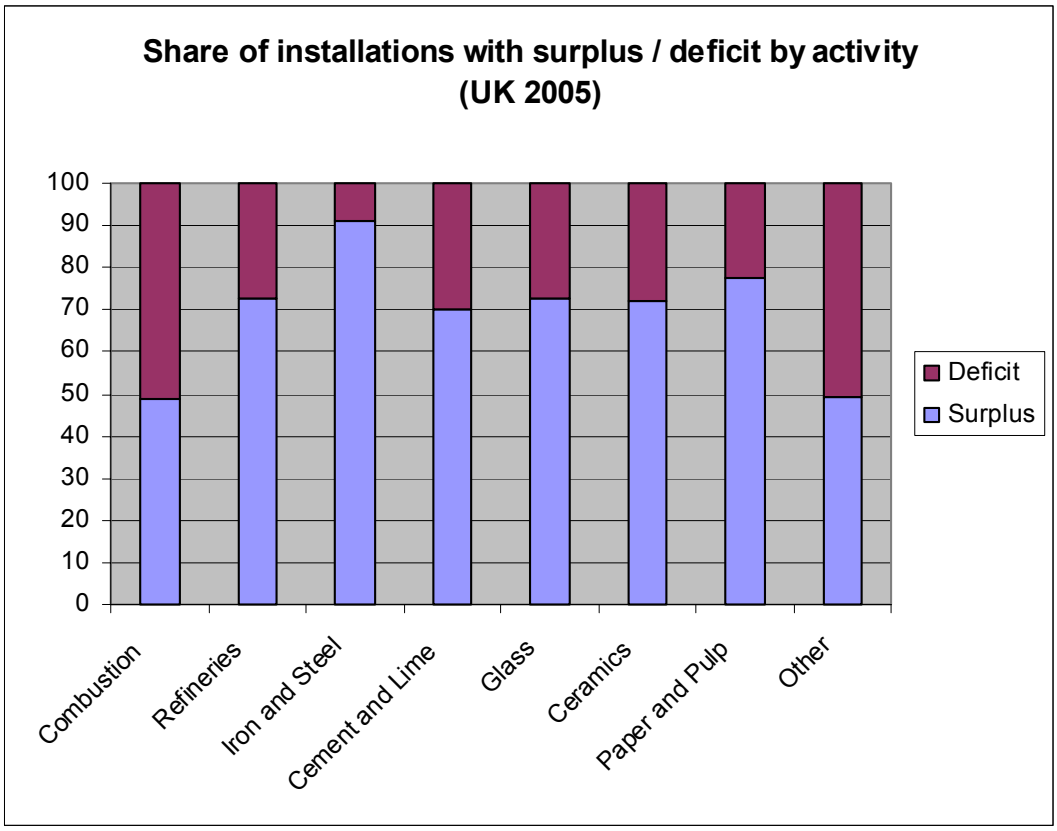
95 The terms energy and industry sector as used in this report do not exactly correspond to the underlying concepts in the Directive. For example, the energy sector would also include energy installations in industry such as CHP plants.

Figure B-2: Surplus/deficit of allowances by activity in percent of allocated quantities of EUAs in the UK



Source: Fraunhofer ISI based on Community Independent Transaction Log (CITL) (CEC 2006c)

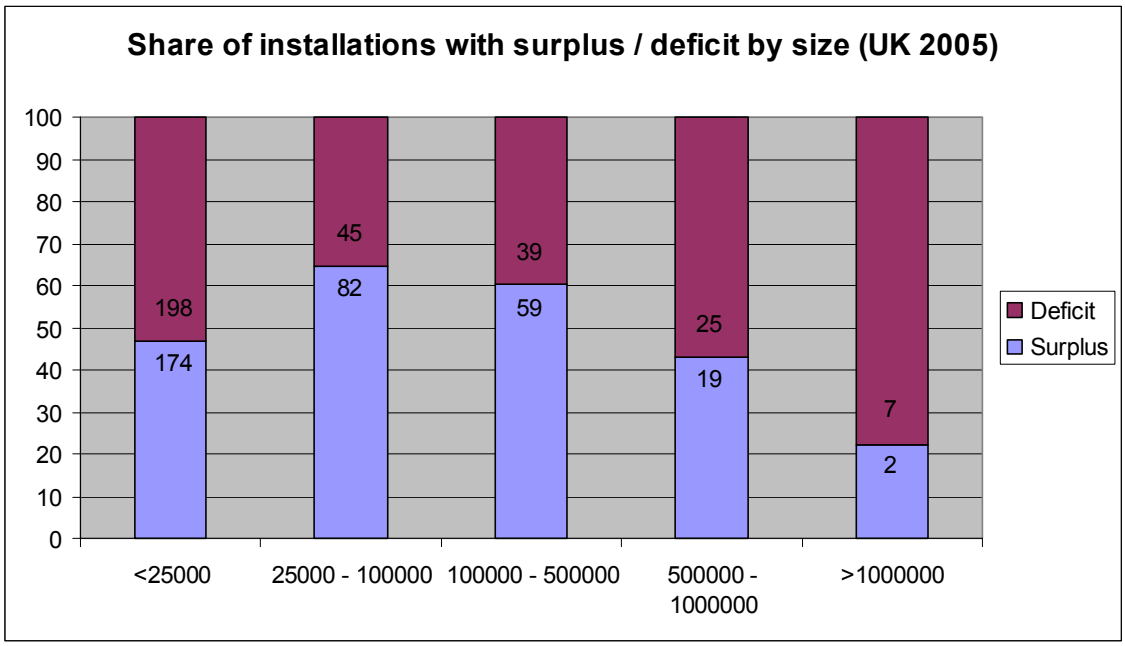
Figure B-3: Share of installations with a surplus or a deficit of EUAs by activity in the UK for 2005



Source: Fraunhofer ISI based on Community Independent Transaction Log (CITL) (CEC 2006c).

Comparing the size of installations (as measured by the allocated quantities of EUAs) to the surplus or deficits in the UK (see Figure B-4) implies that both the smallest and the largest installations show the largest deficits. The distribution as measured in terms of share of installations with a surplus resembles an inverse U.

Figure B-4: Share of installations with a surplus or a deficit of EUAs by size in UK for 2005



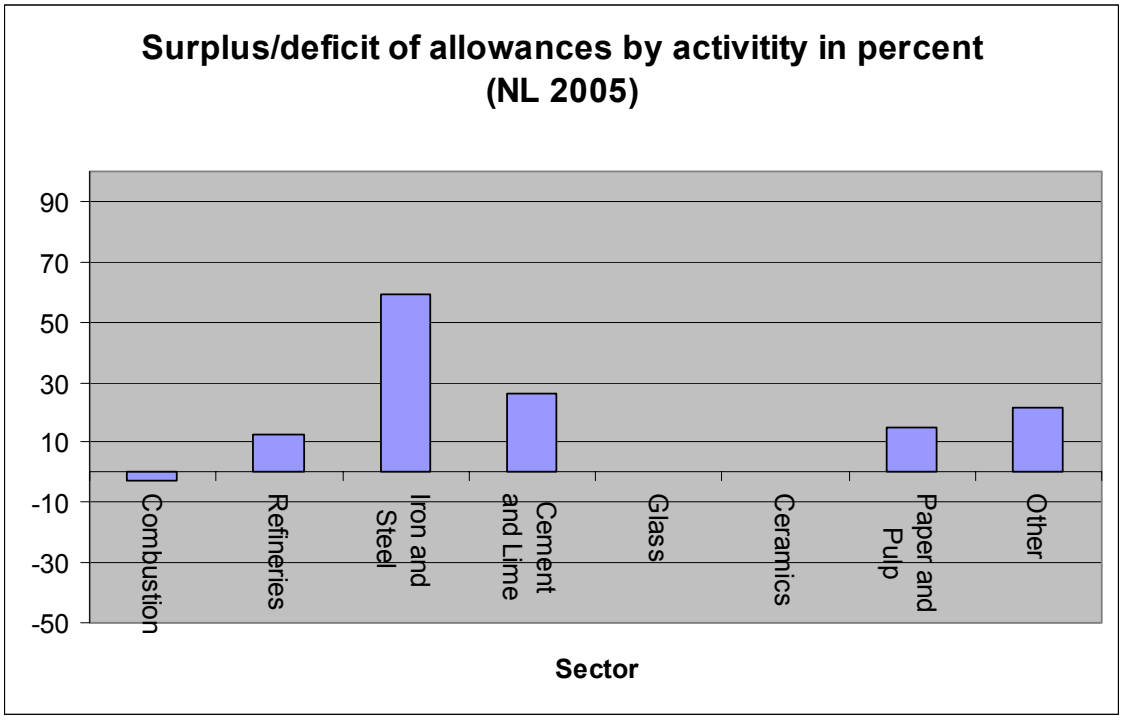
Source: Fraunhofer ISI based on Community Independent Transaction Log (CITL) (CEC 2006c).

B.3 Analysis for the Netherlands

Figure B.5 reflects that the Netherlands' allocation for the first trading period is somewhat more stringent on the energy sector than on the industry sectors. In terms of stringency for the energy sector, the allocation ranges between the rather generous allocation in Germany and the relatively tight allocation in UK. Energy installations in the Netherlands face an average deficit of slightly more than 2.5 %, which corresponds to a total deficit of around 1.4 m EUAs. By comparison, non-energy installations enjoy an average surplus of almost 26%, owing in particular to the huge surplus for the installations in the emissions-intensive iron and steel industries. The total surplus for non-energy installations is approximately 7.5 m EUAs.

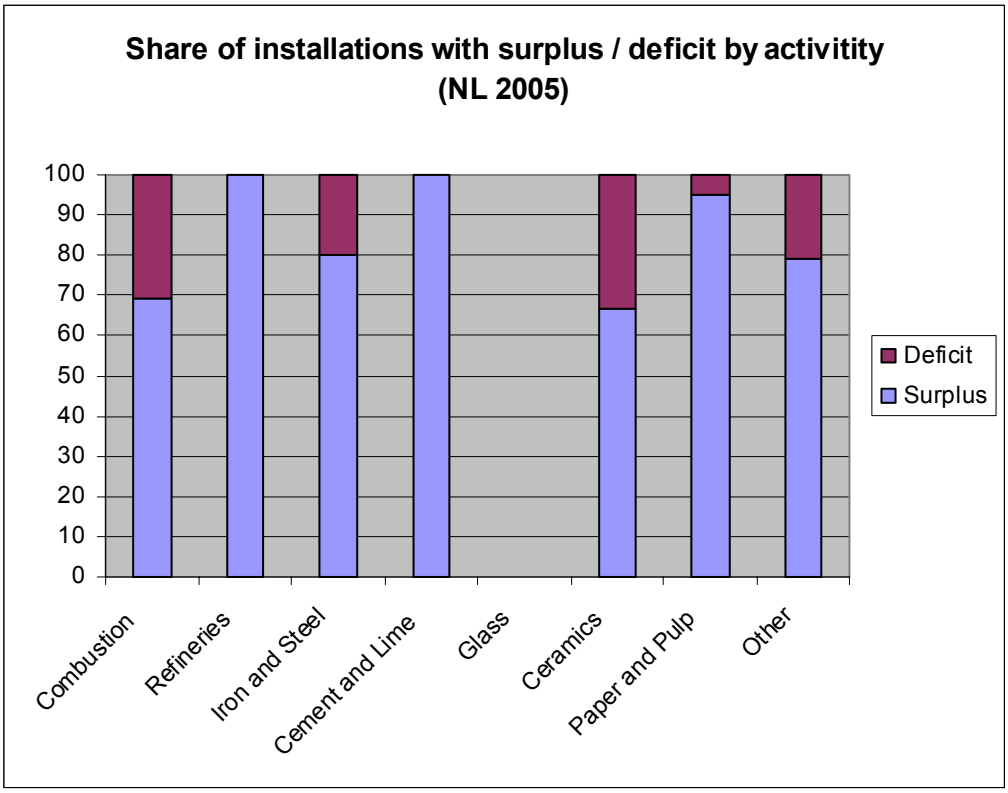
Overall, for the first year of the EU ETS almost three quarters of the installations in the Netherlands received more allowances than they had emitted. Figure B-6 shows that the sectors with the highest shares of installations with a deficit are combustion installations in the energy and industry sectors and the installations in the ceramics sector. All installations in the iron and steel industries and in the cement industry enjoyed a surplus, due to a smaller-than-anticipated growth in 2005.

Figure B-5: Surplus/deficit of allowances by activity in percent of allocated quantities of EUAs in the Netherlands



Source: Fraunhofer ISI based on Community Independent Transaction Log (CITL) (CEC 2006c).

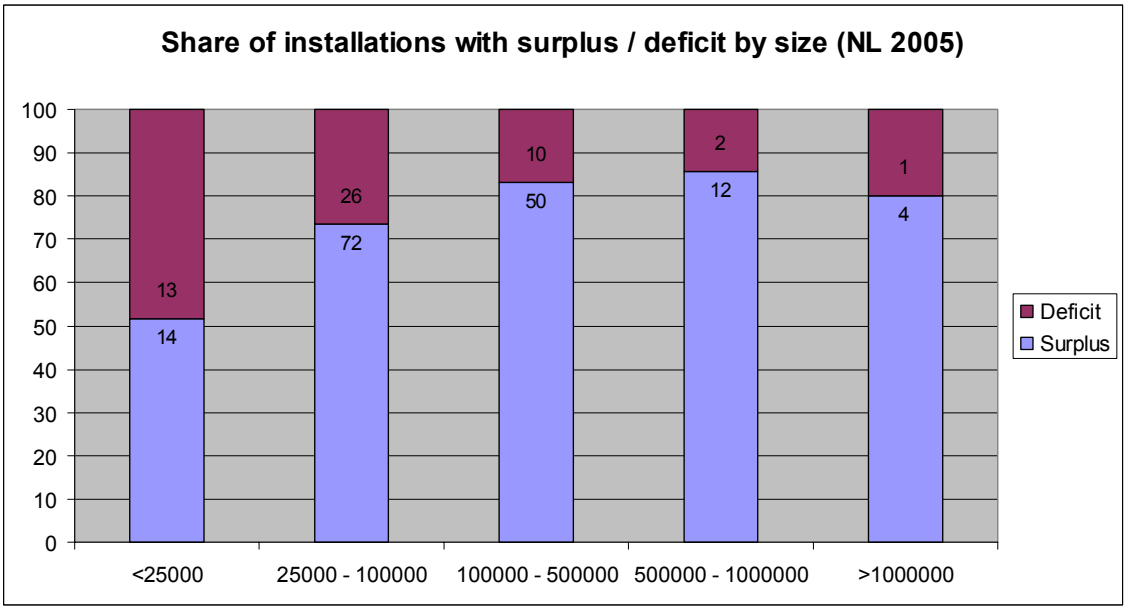
Figure B-6: Share of installations with a surplus or a deficit of EUAs by activity in the Netherlands for 2005



Source: Fraunhofer ISI based on Community Independent Transaction Log (CITL) (CEC 2006c).

As in the UK, the size of installations with the surplus or deficits (see Figure B-7 in Annex B) shows that the allocation in tithe Netherlands appears to have regressive effects: The larger the installation, the larger the surplus.

Figure B-7: Share of installations with a surplus or a deficit of EUAs by size in the Netherlands for 2005



Source: Fraunhofer ISI based on Community Independent Transaction Log (CITL) (CEC 2006c).

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